Ontario

ONTARIO GEOLOGICAL SURVEY

Open File Report 6048

Report of Activities, 2000
Resident Geologist Program

Thunder Bay North Regional Resident Geologist Report:
Thunder Bay North District

by

J.K. Mason, G.D. White, M.S. O'Brien, C. Komar, J. Stewart, R. Debicki and A. Drost

2001

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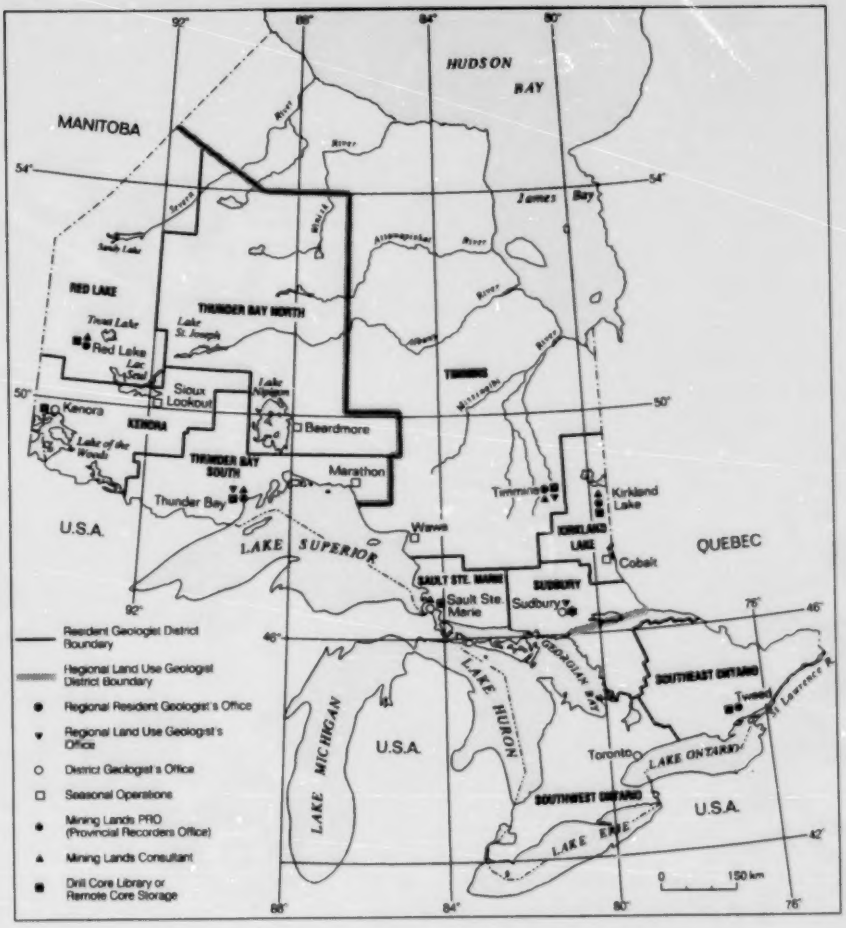

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ONTARIO GEOLOGICAL SURVEY

RESIDENT GEOLOGIST PROGRAM

REPORT OF ACTIVITIES – 2000

THUNDER BAY NORTH
REGIONAL RESIDENT GEOLOGIST REPORT

CONTENTS

1. Thunder Bay North District

2. Regional Land Use Geologist – Northwest

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Ontario

Ontario Geological Survey
Regional Resident Geologist Program

Thunder Bay North Regional Resident Geologist (Thunder Bay North District)--2000

by

J.K. Mason, G.D. White, M.S. O'Brien, C. Komar and J. Stewart

2001

CONTENTS

Thunder Bay North District--2000

INTRODUCTION 1
MINING ACTIVITY 1
EXPLORATION ACTIVITY 2
Rare Metal Pegmatites 2
Gold 2
Platinum Group Elements (PGE) 3
RESIDENT GEOLOGIST PROGRAM STAFF AND ACTIVITIES 15
PROPERTY EXAMINATIONS 20
Gold 20
Pickle Crow Project 20
PGE 23
Thierry Mine 23
Final Lake PGE Occurrence 27
Onaman-Tashota Belt 30
Crooked Green Lake Intrusion 30
Castlewood Lake Intrusion 33
Onaman River Confluence Intrusion 34
Gzowski Lake Area 34
Rare Metal Pegmatites 34
Lilypad Lakes Area 35
Linklater Lake Area 36
Zigzag Lake Area 36
Seymour Lake Area 37
Georgia Lake-Cosgrave Lake Area 38
RECOMMENDATIONS FOR EXPLORATION 38
Operation Treasure Hunt - Lake Sediment Surveys 38
Operation Treasure Hunt - Airborne Geophysical Surveys 40
Tantulum 41
Platinum Group Elements 41
Wabigoon-Quetico Subprovince Boundary 43
OGS ACTIVITIES AND RESEARCH BY OTHERS 43
ACKNOWLEDGEMENTS 44
REFERENCES 46

Tables

1. Assessment files received in the Thunder Bay North District in 2000 6
2. Exploration activity in the Thunder Bay North District in 2000 9
3. Property visits conducted by the Thunder Bay North District in 2000 15
4. PGE targets in the Thunder Bay North District in 2000 24
5. Mineral deposits not being mined in the Thunder Bay North District in 2000 45

Figures

1. Thunder Bay North District (Southeast Map) Exploration Activity, 2000 12
2. Thunder Bay North District (Northeast Map) Exploration Activity, 2000 13
3. Thunder Bay North District (Northwest Map) Exploration Activity, 2000 14
4. Thunder Bay North District (Southeast Map) Property Visits, 2000 17
5. Thunder Bay North District (Northeast Map) Property Visits, 2000 18
6. Thunder Bay North District (Northwest Map) Property Visits, 2000 19
7. Final Lake PGE Occurrence 29
8. Crooked Green Lake Intrusion 32
9. Linklater-Falcon Lakes Area 42

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THUNDER BAY NORTH DISTRICT--2000

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INTRODUCTION

The Thunder Bay North District was expanded in 2000 to include the northern portion of the former Sioux Lookout District. The southern portion of the former Sioux Lookout District has been incorporated into the Kenora District.

The communities of Pickle Lake, Osnaburgh House, Weagamow Lake, Big Trout Lake, Beardmore, Jellicoe, Longlac, Geraldton, Macdiarmid, Nakina, Armstrong, Fort Hope, Kasabonika, Lansdowne House, Summer Beaver and Webequie are situated within the district.

MINING ACTIVITY

The **Musselwhite Mine**, owned by Placer Dome North America Ltd. and TVX-Normandy Americas, is located about 126 km north of Pickle Lake. Access to the mine site is by means of an all-weather airstrip on site or a 43 km, all-weather gravel road connecting the mine site to the northern extension of Highway 599. The mine employs about 270 persons working on a two-week in, two-week out rotating schedule. Approximately 25 to 35% of the workforce is Aboriginal.

Gold at the Musselwhite Mine occurs principally in a sulphidized (pyrrhotite), garnet-amphibole-chert-grunerite-magnetite iron formation. The major ore zones occur in shallow-plunging, antiformal fold closures of minor folds within a large, complex fold structure. Sulphidization and quartz flooding occur along a well-developed axial planar cleavage in the fold hinges. Access to the ore is by means of a ramp. A conveyor system is under planning designed to haul ore from the deeper levels of the mine. A four-year exploration program is actually underway to find and eventually provide access to other sources of ore (satellites sources) and feed the mill that is in expansion over the tonnage limit. In 2000, 55 200 m of exploration and delineation drilling was completed. A ground magnetic survey was also conducted. In 2000, 235 000 new ounces have been added to the reserves and the mineral resources inventory is at 316 540 ounces (14 194 000 tonnes grading 5.59 g/t gold).

The mill is rated at 3650 tonnes per day (in 2001) and utilizes conventional crushing and grinding circuits feeding a carbon-in-pulp plant.

In 2000, the mine produced 245 206 ounces of gold. This was extracted from 1 230 768 tonnes of ore at an average grade of 6.47 g/t gold. Recovery was 95.8%.

EXPLORATION ACTIVITY

Rare Metal Pegmatites

Avalon Ventures Ltd. and **Global Canada Co.** completed an 8-hole, 1094 m diamond-drill program on the Lilypad Lakes tantalum project in Fort Hope, Ontario. Tantalum mineralization ranging in grade from 0.023% to 0.158% Ta_2O_5 over estimated true widths of 0.5 to 28 m were intersected. The Rubellite Dyke was intersected in 6 holes with hole LRD 00-11 encountering 28 m of 0.026% Ta_2O_5 (The Northern Miner, January 8-14, 2001). Grab samples in a previous program returned 0.131% to 0.422% Ta_2O_5 from the JJ Dyke, a portion of the Lilypad Lakes pegmatite field (BCE Emergis E-News Services, 2000-11-13).

K. Fenwick and **D. Leishman** have acquired four rare metal pegmatite targets in the Georgia Lake-Nipigon area, the MNW Stock, the Brink (1.1 million tonnes of 11.63% Li_2O), the Pine Portage, and the Norland pegmatite properties to assess tantalum, cesium and beryllium potential.

Linear Resources Inc. optioned the Seymour Lake pegmatite property, north of Lake Nipigon, from Stares Contracting Corporation. Preliminary sampling and prospecting have been completed, to evaluate this lithium-beryllium-tantalum property (Canada Stockwatch, January 12, 2001).

Murgor Resources Inc. optioned the Zigzag Lake pegmatite property from T. Maitland and G. Clark. The property, located north of Lake Nipigon, hosts five groups of dikes with tantalum potential.

Gold

Cantera Mining Ltd. entered into advanced exploration on the Pickle Crow gold mine property, located northeast of Pickle Lake. The Pickle Crow property is owned by Wolfden Resources Inc. (90%) and Jonpol Explorations Ltd. (10%). Cantera Mining Ltd. completed a bulk sampling program on the No. 1 (Howells) vein, designed to extract 9160 tonnes of mineralization. The sample was processed at Battle Mountain Gold's Golden Giant mill facility in Hemlo, Ontario. A previous bulk sample of 490 tonnes from the No. 5 vein assayed 0.56 ounce per ton gold.

Ontex Resources Ltd. completed diamond drill programs on the Brookbank, Cherbourg and Foxear zones of the Brookbank project in Irwin Township. A new gold resource is being calculated by an independent consulting group. Presently, the Brookbank deposit has a resource of 1.38 million tonnes grading 0.263 ounce per ton gold.

Iron Lake Minerals Inc. commenced a 1600 m drill program (18 holes) on the Iron Lake gold property located 45 miles southwest of Pickle Lake in the Meen-Dempster Lake greenstone belt. Gold is associated with a sulphidized-banded oxide facies iron formation unit similar to Pickle Lake past producing mines. Anomaly "A" is the priority target previously located by geophysics and proximal to previous trenching (BCE Emergis E-News Services, 2000-08-25).

Slam Explorations Ltd. completed a 20 km IP survey and a 6-hole 1203 m diamond drill program on the Opikeigen Lake gold property in Fort Hope, Ontario. Zones OL12 and OL29 were drilled. Assays up to 2.61 g/t gold over 0.9 m were intersected in Zone OL12 and assays up to 1.34 g/t gold over 22.6 m were intersected in zone OL29. An IP survey was completed (Canadian Corporate News, 2000-04-06).

International Taurus Resources Inc. and **International Kodiak Resources Inc.** completed a power stripping and geological mapping program on the Lincoln gold prospect in Tashota, Ontario.

Several gold occurrences associated with silicified, foliated to sheared intermediate tuffs, quartz veins and quartz feldspar porphyry dikes will be sampled in 2001 following an IP survey. A 1999 channel sample taken by property vendor **NWT Copper Mines Ltd.** assayed 0.975 ounce per ton gold over 2.74 m (N. Cox, NWT Copper Mines Ltd., personal communication, 1999).

St. Anthony Resources Inc. discovered two new gold occurrences on the Bearskin Lake gold property in Irwin Township. The "A" zone and Whisky zone, two prominent shear zone-hosted gold occurrences, in mafic metavolcanics, were power stripped and sampled. The Whisky zone is a 35 to 40 m wide shear zone and the "A" zone is a 3 m wide shear. Twelve grab samples on the "A" zone averaged 8.62 g/t gold (BCE Emergis E-News Services, 2000-04-24).

Platinum Group Elements (PGE)

Southwestern Gold Corporation has assigned the Lansdowne House PGE project to affiliate **Aurora Platinum Corp.** The project is located 30 km north of Lansdowne House and consists of 13 088 ha covering a large layered mafic-ultramafic complex, intruding metavolcanics of the Sachigo Subprovince. Aurora's exploration target is a low-grade copper-nickel-PGM deposit and Merensky Reef-type high-grade PGM mineralization. PGM Ventures Inc. holds the adjoining claims, including the previously held Inco (1970s) magmatic deposit (14.6 MT @ 0.58% Cu, 0.37% Ni and unknown PGE). Aurora's targets include a series of prominent AEM anomalies that have not been drilled (www.auroraplatinum.com). An airborne geophysical survey will be initiated in early 2001.

PGM Ventures Inc., formerly **Icelandic Gold Corporation**, acquired the Thierry Mine, Pickle Lake, Ontario in late 2000 from Etruscan Resources. The Thierry Mine, owned by UMEX, produced from 1976 to 1982. Production totalled 967 043 lb. copper, 267 621 lb. nickel, 15 115 oz. platinum, 40 021 oz. palladium and 14 689 oz. gold from 5.759 million tons of ore. Reserves start at 7 million tons grading 1.88% copper and 0.23% nickel with unknown PGE values.

PGM Ventures Inc., formerly **Icelandic Gold Corporation,** acquired the Lavoie Lake property from Spider Resources Inc. The property is located approximately 30 km north of Lansdowne House. A mineral resource of 14.6 million tons grading 0.58% copper and 0.37% nickel is hosted in a layered anorthositic gabbro. Copper-nickel mineralization is associated with disseminated chalcopyrite, pyrrhotite and pyrite. Mineralization on the Lavoie Lake property is known to occur in three separate related zones on the property (BCE Emergis E-News Services, 2000-12-06). PGE potential will be evaluated.

Canplats Resources Corporation and **Canadian Dragon Resources Ltd.** conducted prospecting and sampling on the Grand Bay, Lake Nipigon property.

East West Resource Corporation has acquired the Havoc Lake PGE property located west of English Bay, Lake Nipigon. Mag and IP interpretation suggests a large T-shaped mafic intrusion is present at the junction of two major transcurrent suture systems, Black Sturgeon River fault and Paint Lake fault, therefore illustrating a potential Noril'sk environment (Canada Stockwatch, June 6, 2000). **Donnybrook Resources Inc.** has entered into an agreement on a private placement and consolidation of properties with **Encampment Resources LCC**, a private U.S. company. Wyoming properties and Ontario properties [Northrock (Fort Frances) and Weese Lake (Fort Hope)] are included (Canada Stockwatch, October 4, 2000).

Landore Resources Inc., in exchange for 6 million shares of Landore, has acquired Brancote Holdings' interest in 40 mineral properties in North America. Landore Resources Inc. completed a reconnaissance geological mapping, prospecting and sampling program on the Juneau-Ketchikan Lake

Cu-Ni-PGE property, located northeast of Lake Nipigon and east of the Norcal-Lamaune property. A 2.2 million ton reserve grading 0.87% nickel and 0.59% copper is present (Mason et al. 2000, p.15-17). An independent consultant resampled and assayed previously drilled intervals of sulphide mineralization in the B4-7 prospect, Juneau-Ketchikan Lake property, located north of Lake Nipigon. Drilling was performed by International Mogul in 1969. Assays include: DDH 69-25 - 37.5 m grading 0.64 g/t Pd and DDH 69-20 - 4.6 m grading 2.19 g/t Pd (Press Release, January 31, 2001).

Wing Resources have assembled a large claim group at Toronto Lake immediately east of Landore Resources Inc.'s Juneau-Ketchikan Lakes property. PGE and VMS targets are being evaluated at Toronto Lake.

Norcal Resources Ltd. released sampling results from the Lamaune Lake property on the Zap and New Zone showings. Assays (grab samples) returned up to 1.55% Cu, 1.11% Ni, 0.15% Co, 0.89 g/t Pt and 0.88 g/t Pd. Both zones occur along a 2 km long Max-Min/VLF trend. The Grassy Pond zone assayed up to 0.33% Cu, 0.17% Ni, 0.68 g/t Pd and 0.22 g/t Pt from 27 grab samples over an 800 m strike length (Canada Stockwatch, October 3, 2000, p.32). Geological mapping and ground geophysical surveys have been completed. Disseminated to semi-massive net-textured pyrrhotite, pyrite and chalcopyrite occur at Lamaune Lake (2000-11-07 CCN Disclosure).

Maple Minerals Inc. and **East West Resource Corporation** have conducted followup prospecting on geological and airborne geophysical targets (from previous work) on the Eva-Kitto PGE (peridotite) property southwest of Beardmore (East West Resource Corporation, Annual Report, 2000).

New Millennium Metals Corporation-Canadian Golden Dragon Resources Ltd. conducted prospecting and mapping on the Ottertooth property located west of Lake Nipigon in the Obonga Lake area, as followup to the Armstrong-Lake Nipigon Area Lake Sediment Survey (Ontario Geological Survey 2000a). Significant Pt-Pd-Au lake sediment anomalies were identified in the survey, released this year.

St. Anthony Resources Inc. has agreed to acquire a controlling portion in TLC Resources Inc. TLC is a mineral exploration company holding an option to acquire 100% interest in the 2800 acre Camp 25-Yak property located between Geraldton and Longlac. A pyroxenite boulder contains disseminated to net-textured sulphides including pyrrhotite, pentlandite and chalcopyrite. A sample taken by the company assayed 0.85% nickel, 0.52% copper, 0.99 grams per tonne platinum, 0.52 grams per ton palladium and 0.31 grams per tonne gold (BCE Emergis E-News Services, 2000-05-19). Backhoe float tracing was conducted as well as surficial geological mapping and till sampling undertaken on the Camp 25 property.

Fjordland Minerals Ltd. completed a 630 m fence of 4 drill holes totalling 535 m on the Kibler project, 10 km north of Pickle Lake. The program objective was to test the platinum-palladium potential of a 6 km x 4 km zoned intrusive complex interpreted from a detailed airborne magnetic survey. Low PGE values were intersected (Canada Stockwatch, June 28, 2000). Surface sampling was also completed on the Pashkokogan Lake PGE property (V. Tanaka, Fjorland Minerals Ltd., personal communication, 2000).

Platinex Inc. conducted exploration on the Big Trout Lake property, centred on Nemeigusabins Lake in northwestern Ontario. The property comprises 221 contiguous mining claims that cover a 19 km strike length over the southern limb of the Big Trout Lake layered intrusion. Drilling by previous operators has confirmed that anomalous PGE mineralization associated with specific lithological layers within the intrusion occurs along a 6 km trend within the ultramafic portion of the intrusion. Furthermore, this drilling has shown that intense alteration and/or structural displacement of rock units have complicated the ability to trace mineralized zones. Platinex's exploration program commenced in

June 2000, when Fugro Airborne Surveys Ltd. completed a 522 line km DIGHEM V electromagnetic, resistivity and magnetic survey over the project area. Platinex has contracted Burnside Environmental Inc. to fuse RADARSAT and LANDSAT data with the new IKONOS satellite imagery. Furthermore, Burnside will fuse the satellite imagery with airborne geophysical survey data and compiled geological data into a multi-layered GIS data set from which they will conduct multi-criteria analysis to gain a better understanding of structural displacements, subsurface bedrock geology, and PGE mineralization within the project area. As this remote sensing project is helping to develop a new commercial application for RADARSAT imagery, the federal government, through the Canadian Space Agency, is supporting the Platinex and Burnside efforts through its ANDRO-2 program. To augment the remote sensing program, Professor W.A. Morris of McMaster University has been granted access to Platinex's digital geophysical and satellite imagery data, from which he is developing, through interferometric interpretation, a digital elevation map which can be manipulated more sensitively than other digital elevation data sets. The government of Ontario is supporting this research through a Centre for Research in Earth and Space Technology (CRESTech) grant. It is anticipated that a 3000 m diamond drilling program will commence in early 2001 (L. Burdon, Platinex Inc., personal communication, 2000).

P. McWilliams and **R. Koivisto** staked, prospected and sampled three priority lake sediment locations from the Operation Treasure Hunt Armstrong-Lake Nipigon Open File Report 6027.

Table 1. Assessment files received in the Thunder Bay North District in 2000.

Abbreviations

AEM ..... Airborne electromagnetic survey
AM ..... Airborne magnetic survey
ARA ..... Airborne radiometric survey
Beep ..... Beep Mat survey
Bulk ..... Bulk sampling
DD ..... Diamond drilling
DDH ..... Diamond drill hole(s)
DGP ..... Down-hole geophysics
GC ..... Geochemical survey
GEM ..... Ground electromagnetic survey
GL ..... Geological Survey
GM ..... Ground magnetic survey
GRA ..... Ground radiometric survey
Grav ..... Gravity survey
HLEM ..... Horizontal loop electromagnetic survey
HM ..... Heavy mineral sampling
IM ..... Industrial mineral testing and marketing
IP ..... Induced polarization survey
Lc ..... Linecutting
Met ..... Metallurgical testing
OD ..... Overburden drilling
ODH ..... Overburden drill hole(s)
PEM ..... Pulse electromagnetic survey
PGM ..... Platinum group metals
Pr ..... Prospecting
RES ..... Resistivity survey
Samp ..... Sampling (other than bulk)
Seismic ..... Seismic survey
SP ..... Self-potential survey
Str ..... Stripping
Tr ..... Trenching
UG ..... Underground exploration/development
VLEM ..... Vertical loop electromagnetic survey
VLFEM ..... Very low frequency electromagnetic survey

Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
Ashmore Township	Houghton, F.	1998	DD, Str, Samp	2.20147	42E10/NW
Ashmore Township	Shields, S.	1999	GL, Str	2.20197	42E10/NW
Coughlan Lake	Zygmont, K.	1999	Pr	2.19853	42L04/SE
Dorothea Township	Lassila, P.	1999	Pr	2.20253	52H09/NE
Elmhirst and Walters townships	Houghton, F.	1999	DD, Samp	2.20049	42E12/NE, 42E13/SE
Elmhirst Township	Dean, R.	1998	Str, Samp	OP98-021,022	42E13/SE
Elmhirst Township	Lance, C.	1999	Pr	2.20693	42E13/SE
English Bay	Corona Gold Corporation	1998	AM, AEM, ARA	2.19719	52H15/NW
English Bay	Corona Gold Corporation	1998	DD	2.19664	52H15/NW
Ferguson and Opikeigen lakes	Avalon Ventures Ltd.	2000	DD	2.20656	52P09/NW/NE
Gzowski Township	Milks, G.	1999	Str	2.19662	42L06/SW, 42L05/SE
Gzowski Township	Milks, G.	1999	Str, Tr	2.19747	42L06/SW, 42L05/SE
Gzowski Township	NWT Copper Mines Limited	1999	Str, Tr, Samp	2.19848	42L04/NE
Hale and Tillet lakes	Firth, Goettler & Assoc. Ltd.	1999	DD	2.19655	43D02/SW, 42M15/NW

Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
Havoc Lake	East West Resource Corporation	2000	GEM, IP	2.20652	52H14/NE
Havoc Lake	King, R.	1997-98	Pr, Samp	2.19668	52H14/NE
Irwin Township	Cox, T.	1999	GL, Pr, Tr, Samp	2.19914	42E12/NW
Irwin Township	Metalore Resources Ltd.	1999	DD, Samp	2.19692	42E12/NW
Irwin Township	Metalore Resources Ltd.	1999	DD, Samp	2.20298	42E12/NW
Irwin Township	Pettit, C.	1999	DD, Samp	2.20066	42E12/NW
Junior Lake	Landore Resources Inc.	1999	GL, Samp	2.20178	42L05/NW
Junior Lake	Wing Resources Inc.	2000	GL, Str, Tr	2.20539	42L05/NW
Kaby Lake	Checkley, F.	1998	Pr, Str, Samp	2.19551	42E13/SE
Klotz Lake	Swereda, M.	1998	Str, Tr, Samp	2.19694	42F13/SW
Martin, Castlewood and Fullerton lakes	Holt, L.	1999	GEM, GM, Pr, Str, Samp	2.20064	42E13/NW/NE
Maryjane Lake	Goodman, H.	1999	Str, Samp	2.19691	52H09/SE
McBean Lake	Hogg, C.	1999	GEM, GM	2.20021	42E10/NE
McComber Township	Skalesky, A.	2000	Pr	2.20416	42E12/NW
Metcalfe Lake	Yzerdraat, W.	1999	GC	2.20408	42L04/NE
Metcalfe Lake	Yzerdraat, W.	1999	GC	2.19653	42L04/NE
Metcalfe Lake	Yzerdraat, W.	1999	GC	2.19792	42L04/NE
Metcalfe Lake	Yzerdraat, W.	1999-00	GC	2.20130	42L04/NE
Metcalfe Lake	Yzerdraat, W.	1999-00	GM	2.20619	42L04/NE
Mikinak Lake	Fenwick, K.	2000	IP	2.20241	52H07/SW
North Caribou Lake	Romios Gold Resources Inc.	1999	DD, Samp	2.20391	53B16/SW
Oboshkegan Township	Cameco Corporation	1998	GC, GL, DD, Str, Samp, Petrography	2.19772	42L04/NE, 42L03/NW
Oboshkegan Township	Cox, N.	1999	GL, Pr, Str, Tr, Samp	2.19915	42L04/NE
Oboshkegan Township	Roach, S.	1999-00	GEM, GM, GC, GL, Samp	2.20183	42L04/NE/SE
Oboshkegan Township	Saunders, D.	1999	Reblazing lines	2.19602	42L04/NE

Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
Opikeigen Lake	Slam Exploration Ltd.	1999	IP, RES	2.20244	52P09/SE/NE
Pifher Township and Tyrol Lake	Clausnitzer, D.	2000	Str, Tr, Samp	2.20067	42E13/SW
Rickaby and Lapierre townships	Nelson, M.	1999	GL, Pr, Str, Tr, Samp	2.20051	42E13/SE, 42E14/SW
Rickaby Township	Whalen Resources Ltd.	1998	DD, Samp	2.19938	42E13/SE
Sim Lake	Smith, B.	1998	GEM, GM, Pr, Samp	2.19774	52P01/SE
Sim Lake	Smith, B.	1999	GL, Pr	2.19775	52P01/SE
Skinner and Zeemel lakes	Placer Dome Ltd.	1999	GEM, GM	2.20152	53B09/SW/NW
Summers Township	Lafontaine, S.	1999	Pr, Str	2.20222	42E12/NW, 52H09/NE
Summers Township	Ternowesky, J.	2000	Samp	2.20411	42E12/NW
Talbot Lake	Denison Mines Ltd.	1999	GL, Samp	2.19802	52P15/SW
Talbot Lake	Denison Mines Ltd.	2000	DD	2.20638	52P15/SW
Thomas Lake	Leo Alarie and Sons Limited	1999	Samp	2.20462	42F05/NE
Treptow Lake	Willy, A.J.	1998	Str, Tr	2.19663	42E14/SE
Treptow Lake and Kirby Township	Johansen, T.	1998	DD, Samp	OP98-003	42E14/SE
Tyrol Lake	Cote, R.	1999	GL, Pr, Str, Tr	2.20054	42E13/SW
Vincent Township	Maki, N.	1999	Str, Tr	2.20052	42E12/NE
Vincent Township	Pichette, V.	1998	Pr, Str, Tr	2.19725	42E12/NE
Walters and Irwin townships	Cox, N.	1998	Pr, Tr, Samp	2.19880	42E12/NE/NW
Walters and Irwin townships	Cox, N.	1998	Pr, Tr, Samp	OP98-018-020	42E12/NE/NW
Walters and Irwin townships	Cox, N.	1999	GEM, GM	2.20050	42E12/NE/NW
Walters Township	Lassila, P.	1999	GEM, GM, Pr, Str, Tr	2.19916	42E12/NE/NW

Table 2. Exploration activity in the Thunder Bay North District in 2000 (keyed to Figures 1, 2 & 3).

Abbreviations

AEM ..... Airborne electromagnetic survey
AM ..... Airborne magnetic survey
ARA ..... Airborne radiometric survey
Beep ..... Beep Mat survey
Bulk ..... Bulk sampling
DD ..... Diamond drilling
DDH ..... Diamond drill hole(s)
DGP ..... Down-hole geophysics
GC ..... Geochemical survey
GEM ..... Ground electromagnetic survey
GL ..... Geological Survey
GM ..... Ground magnetic survey
GRA ..... Ground radiometric survey
Grav ..... Gravity survey
HLEM ..... Horizontal loop electromagnetic survey
HM ..... Heavy mineral sampling
IM ..... Industrial mineral testing and marketing
IP ..... Induced polarization survey
Lc ..... Linecutting
Met ..... Metallurgical testing
OD ..... Overburden drilling
ODH ..... Overburden drill hole(s)
PEM ..... Pulse electromagnetic survey
PGM ..... Platinum group metals
Pr ..... Prospecting
RES ..... Resistivity survey
Samp ..... Sampling (other than bulk)
Seismic ..... Seismic survey
SP ..... Self-potential survey
Str ..... Stripping
Tr ..... Trenching
UG ..... Underground exploration/development
VLEM ..... Vertical loop electromagnetic survey
VLFEM ..... Very low frequency electromagnetic survey

No	Company/Individual (Occurrence Name) or Property	Township/Area (Commodity)	Exploration Activity
1	Albert, O. (Caramat Lake-Pic River property)	SE Longlac (Pd, Pt, Cu, Ni)	DD
2	Aurora Platinum Corp.	N. Lansdowne House (Pd, Pt, Cu, Ni)	Compilation, Pr
3	Avalon Ventures Ltd.- Global Canada Co. (Lilypad Lake property)	Fort Hope (Ta, Cs, Li)	GL, GC, Tr, DD
4	Axcension Capital Corp. (Barton Bay property)	Geraldton (Au)	GL, Samp
5	Barrick Gold Corp. (Lac properties) (MacLeod-Cockshutt Mine)	Geraldton (Au)	Rehabilitation
6	Canplats Resources Corporation- Canadian Golden Dragon Resources Ltd.	Grand Bay (Pd, Pt, Cu, Ni)	Pr, Samp
7	Cantera Mining Limited- Wolfden Resources Inc.- Jonpol Explorations Ltd. (Pickle Crow Gold Mines)	Pickle Lake (Au)	Bulk
8	Cote, M. and Cote, R.	McQuesten Township (Au)	Pr, Samp
9	Cote, Richard and Cote, Robert (Miner Lake property)	Pifher Township (Au, Cu, Zn)	Pr, Samp
10	Cote, Richard and Cote, Robert (W. Archie Lake property)	Summers Township (Au)	Pr, Str, Samp
11	Denison Mines Limited (Talbot Lake property)	Fort Hope (Au)	DD

No	Company/Individual (Occurrence Name) or Property	Township/Area (Commodity)	Exploration Activity
12	Donnybrook Resources Inc.- Encampment Resources LLC (Weese Lake property)	N. Lake Nipigon (Pd, Pt, Cu, Ni)	Pr
13	East West Resource Corporation (Havoc Lake property)	English Bay (Pd, Pt, Cu, Ni)	GM, IP, RES, Lc
14	Fjordland Minerals Ltd. (Pash property)	Pashkokogan Lake (Pd, Pt, Cu, Ni)	GL, Samp
15	Fjordland Minerals Ltd. (Kibler stock)	Pickle Lake (Pd, Pt, Cu, Ni)	DD
16	Goodman, H. (Cleo Point property)	Dorothea Township (Au)	Pr
17	Greenland, H.	Geraldton (Au)	Pr
18	Holt, L. and Cox, N. (Final Lake property)	Final Lake (Pd, Pt, Cu, Ni)	Pr, Str, Samp
19	Houghton, F. (Mud Lake property)	Elmhirst Township (Au)	Pr, Samp
20	Houghton, F. (Tom Johnson property)	E. Lake Nipigon (Au)	Pr, Samp
21	Houghton, F. and Clarke, L.	Frank Lake (Pd, Pt, Cu, Ni)	Pr
22	Houghton, F. and Lance, C. (Northwind Lake property)	Northwind Lake (Pd, Pt, Cu, Ni)	Pr, Samp
23	Inco Limited	Marshall Lake (Pd, Pt, Cu, Ni)	GL, Pr, Samp
24	International Taurus Resources Inc.- International Kodiak Resources Inc.	Tashota (Au)	GL, Str
25	Iron Lake Minerals (Iron Lake gold property)	Pickle Lake (Au)	DD
26	Johansen, T. (Kirby Lake Zn property)	Kirby Township (Zn)	Str, Tr, Samp
27	Lafontaine, A.	O'Sullivan Lake (Pd, Pt, Cu, Ni)	Pr, Samp
28	Lance, C.	Toronto Lake (Pd, Pt, Cu, Ni)	Pr
29	Landore Resources Inc.- Brancote Holdings PLC (Juneau Lake property)	N. Lake Nipigon (Pd, Pt, Cu, Ni)	GM, Pr, Samp
30	Lassila, P. and Houghton, F.	Walters Township (Au)	GL, Pr
31	Maple Minerals Inc.- East West Resource Corporation (Eva-Kitto townships property)	Beardmore (Pd, Pt, Cu, Ni)	Pr, Samp
32	McWilliams, P. and Koivisto, R.	Armstrong (Pd, Pt, Cu, Ni)	Samp
33	Milks, G.	Tashota (Zn, Cu, Au)	Pr, Str, Samp
34	Navigator Exploration Corp.	North Caribou-Sachigo Belts	Compilation
35	New Millennium Metals Corporation- Canadian Golden Dragon Resources Ltd. (Ottertooth property)	Obonga Lake (Pd, Pt, Cu, Ni)	GM, Pr
36	Norcal Resources Ltd. (Lamaune Lake property)	N. Lake Nipigon (Pd, Pt, Cu, Ni)	GL, GEM, GM, Pr, Str, Tr, Lc, Samp

No	Company/Individual (Occurrence Name) or Property	Township/Area (Commodity)	Exploration Activity
37	Ontex Resources Limited (Cherbourg, Brookbank and Foxear properties)	Irwin Township (Au)	DD
38	O'Reilly, G. (Linklater Lake tin property)	Armstrong (Sn)	Pr, Samp
39	Pettit, C. (Nora Lake property)	Walters Township (Au)	Pr
40	PGM Ventures Inc. (Lavoie Lake property)	N. Lansdowne House (Pd, Pt, Cu, Ni)	Compilation
41	PGM Ventures Inc. (Thierry Mine)	Pickle Lake (Pd, Pt, Cu, Ni)	Compilation
42	Pifher Resources Inc.	Pifher Township (Pd, Pt, Cu, Ni)	GL, Lc
43	Placer Dome Inc.-TVXNA (Musselwhite Mine)	North Caribou Belt (Au)	DD
44	Platinex Inc. (Big Trout Lake)	Big Trout Lake (Pd, Pt, Cu, Ni)	AEM, AM, RADARSAT, LANDSAT
45	Roach, S. and Yzerdraat, W. (Metcalfe-McDonough property)	Metcalfe Lake (Cu, Zn, Au)	GL, Samp
46	Roxmark Mines Limited (Northern Empire Mine)	Beardmore (Au)	Mill Renovation
47	Roxmark Mines Limited (Sand River Mine)	Beardmore (Au)	Pr, Compilation
48	St. Anthony Gold (Bearskin Lake property)	Walters Township (Au)	GL, Str, Samp
49	St. Anthony Resources Inc.-TLC Resources Inc. (Camp 25-Cote Float)	Geraldton (Pd, Pt, Cu, Ni)	GL, Str, Tr, Samp
50	Shields, S. (Roche Long Lac property)	Geraldton (Au)	GL, Pr, Samp
51	Slam Exploration Ltd. (Opikeigen Lake property)	Fort Hope (Au)	DD
52	Swereda, M. and Theriault, O.	Klotz Lake (Au)	GL, Pr, Samp
53	Ternowesky, J. (Standingstone property)	Summers Township (Pd, Pt, Cu, Ni)	Pr, Str
54	Thibault, D. and Smith, B. (Sim Lake property)	Sim Lake (Pd, Pt, Cu, Ni)	Pr, Samp
55	Wing Resources	Toronto Lake (Au, Pd, Pt, Cu, Ni, Zn)	Pr

Thunder Bay North District--2000

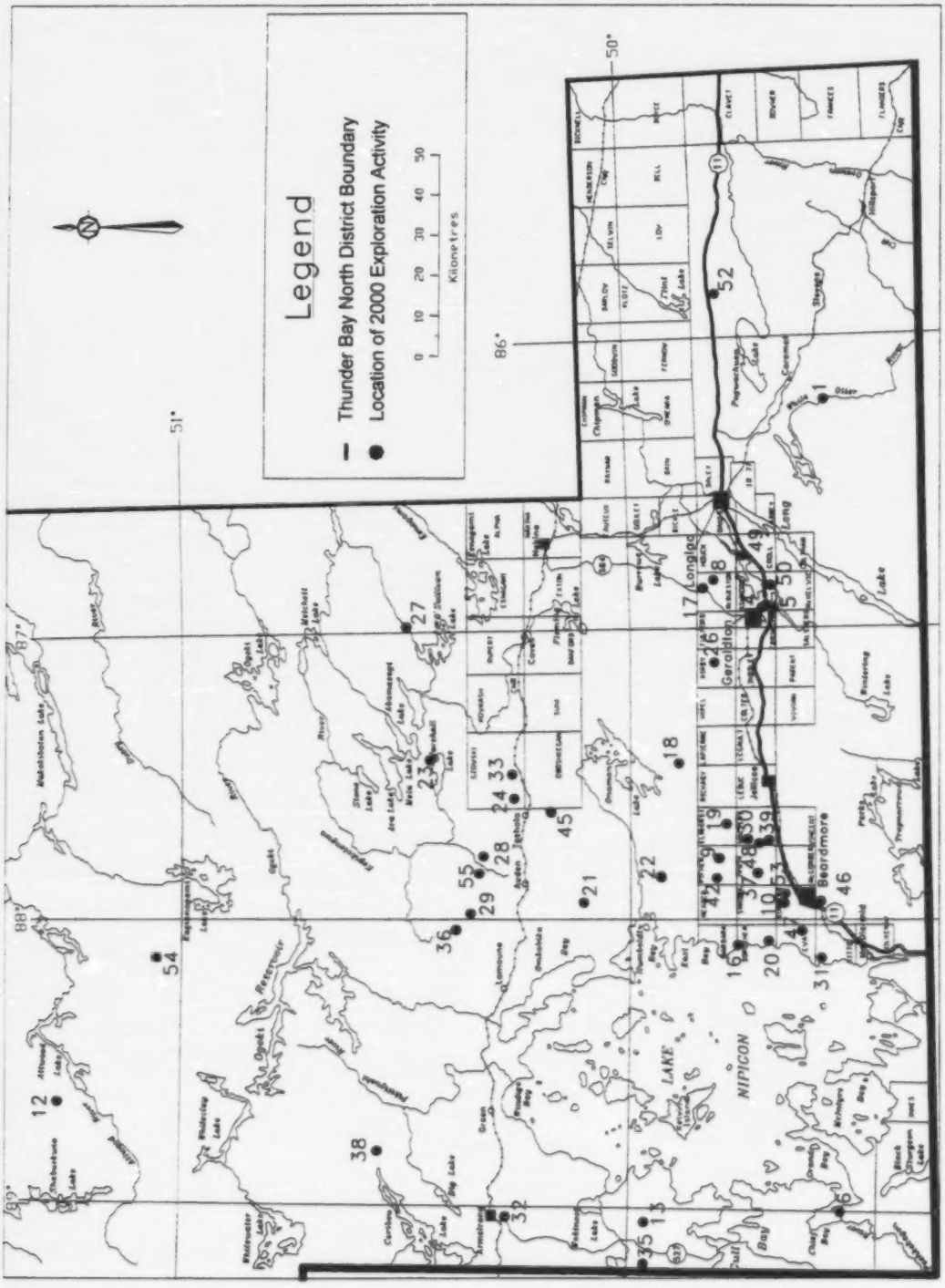

Figure 1. Thunder Bay North District (Southeast Map) Exploration Activity, 2000.

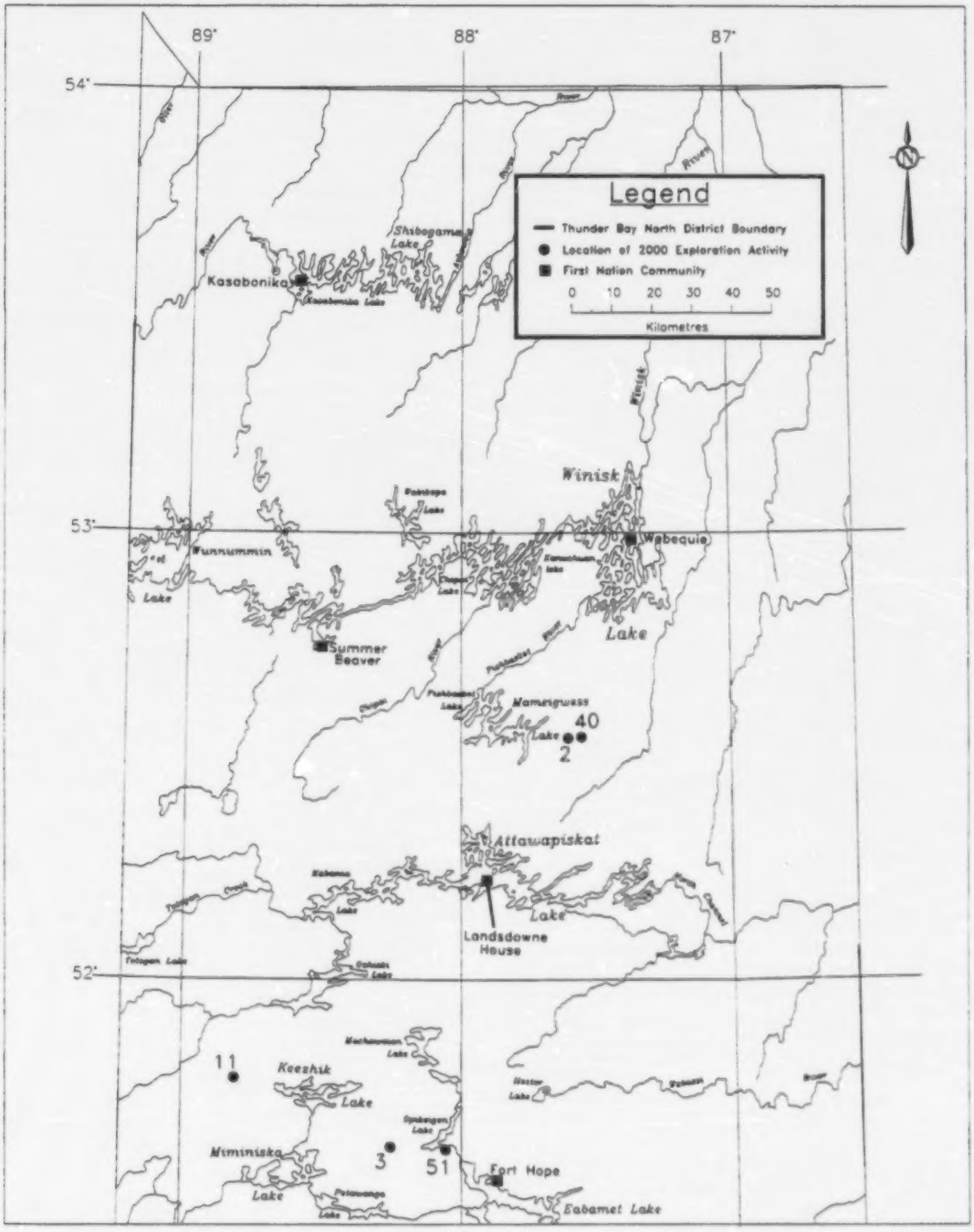

Figure 2. Thunder Bay North District (Northeast Map) Exploration Activity, 2000.

Thunder Bay North District--2000

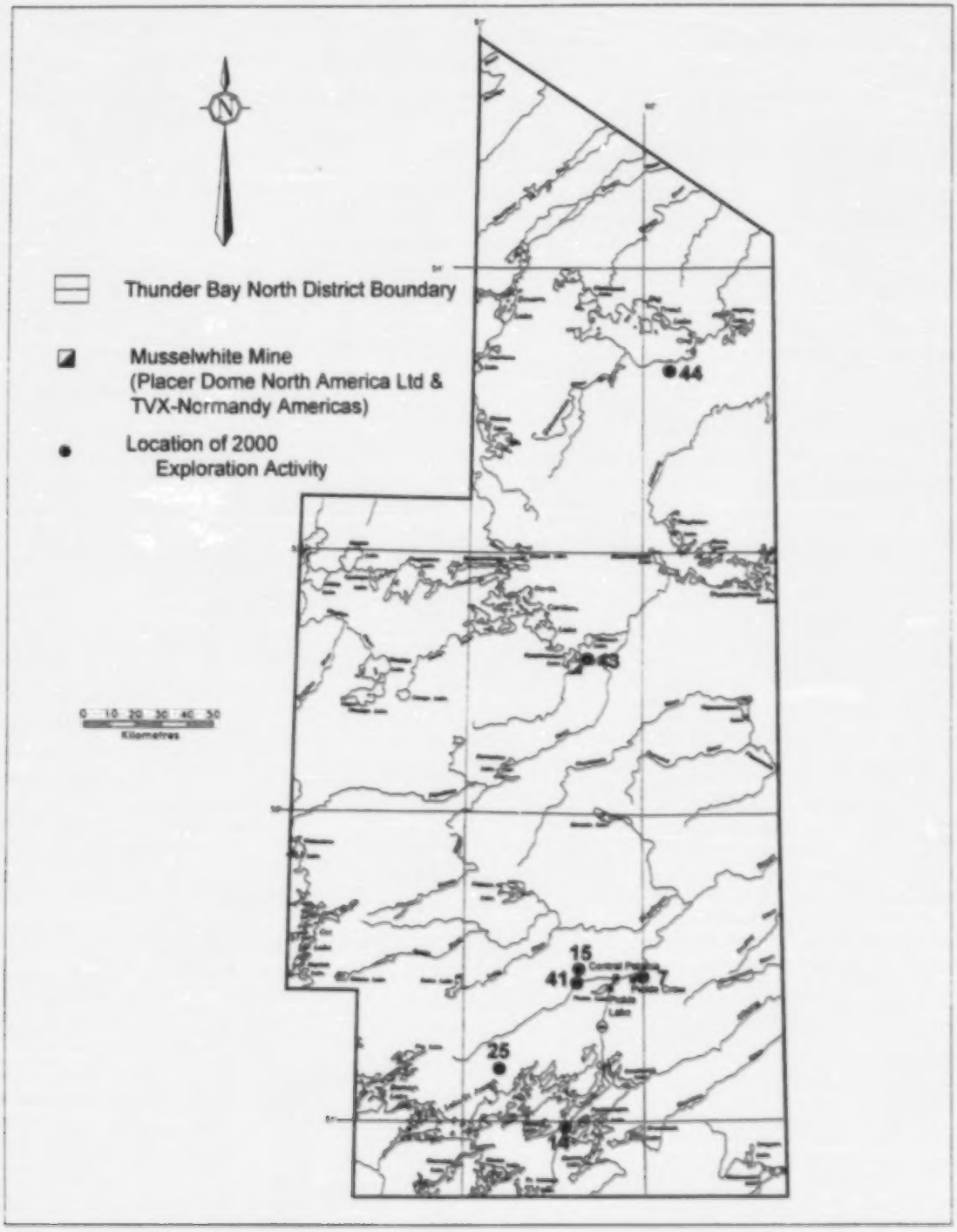

Figure 3. Thunder Bay North District (Northwest Map) Exploration Activity, 2000.

RESIDENT GEOLOGIST PROGRAM STAFF AND ACTIVITIES

During 2000, the staff of the Thunder Bay North Resident Geologist Program included: J. Mason, Regional Resident Geologist; G. White, District Geologist; C. Komar, Administrative Assistant; A. Lichtblau, District Support Geologist (January to August) and J. Stewart, District Support Geologist (September to December). Significant support to the Program was also provided by M. O'Brien, Regional Support Geologist for the Northwest Region and A. Dowton, Administrative Assistant. E. Onabigon, Community Resource Geologist, delivered prospector education and information to First Nations. A. Drost, Regional Land Use Geologist NW commenced work in September.

In 2000, the Sioux Lookout North assessment files were incorporated into the Thunder Bay office. Thirty property visits were conducted and 75 Mineral Deposit Inventory (MDI) records were edited. The Resident Geologist Program handled 2067 personal consultations and 1413 telephone inquiries in the Beardmore, Geraldton and Thunder Bay offices. The Beardmore field office, established in 1996 in conjunction with the community of Beardmore, was staffed one day per week, from May to October. The Geraldton field office was maintained in conjunction with the Northern Development Office two days per month, from May to October. Staff attended the Cordilleran Roundup in Vancouver in January, providing a display, the Prospectors and Developers Convention in Toronto during March providing displays, the Northwestern Ontario Prospectors Association (NWOPA) Mines and Minerals Symposium in Thunder Bay in April, providing a display and talk, the Manitoba Mining and Minerals Convention in November, and the southern Ontario Mines and Minerals Symposium in December, providing a talk and display.

Table 3. Property visits conducted by the Thunder Bay North District in 2000.

Number (keyed to Figures 4, 5 & 6)	Property/Occurrence
1	Bankfield Mine Property (Roxmark Mines Limited): Au
2	Bearskin Lake Occurrence (St. Anthony Resources): Au
3	Camp 25-Yak Property (St. Anthony Resources, TLC Resources Inc.): Pt, Pd, Cu, Ni
4	Cleo Point Property (H. Goodman Jr.): Au
5	Consolidated Louanna Gold Mine: Au
6	Cote-Archie Lake Occurrence (R. Cote, R. Cote): Au
7	Crooked Green Lake Gabbro Area: PGE potential
8	Dona Lake Mine: Au
9	Eva-Kitto Property (Maple Minerals Inc., East West Resource Corporation): Pt, Pd, Cu, Ni
10	Final Lake Property (L. Holt, N. Cox): Pt, Pd, Cu, Ni
11	Gzowski Lake Gabbro Area: PGE potential
12	Hutchineau Gold Mine Property: Au
13	Klotz Lake Property (M. Swereda, O. Theriault): Au
14	Leitch Gold Mine Property (Teck Corporation): Au

Number (keyed to Figures 4, 5 & 6)	Property/Occurrence
15	Lincoln (Hull) Gold Occurrence (International Taurus Resources Inc., International Kodiak Resources Inc.): Au
16	Metcalfe-McDonough Property (S. Roach, W. Yzerdraut): Base Metals
17	Miner Lake Property (R. Cote): Au, Cu, Zn
18	Missing Link Extension Occurrence (M. Nelson): Au
19	Missing Link Occurrence (L. Holt, M. Nelson, N. Cox): Au
20	Nora Lake (Wenzoski) Occurrence (C. Pettit): Au
21	Northwind Lake Property (F. Houghton, C. Lance): PGE potential
22	Ogoki-Marshall Lake PGE Occurrence (F. Houghton): Pt, Pd
23	Pickle Crow Gold Mine (Cantera Mining Ltd., Wolfden Resources Inc.-Jonpol Explorations Ltd.): Au
24	Roche Long Lac Gold Prospect (S. Shields): Au
25	Sand River Gold Mine Property (Roxmark Mines Limited): Au
26	Theresa Gold Mine Property (Duration Mines Ltd.): Au
27	Thierry Mine (PGM Ventures Inc.): Pt, Pd, Cu, Ni
28	Tom Johnson Bish Bay Occurrence (F. Houghton): Au
29	Tombill Mine Property (Stuart R. Horne & Hornekids Ltd.): Au
30	Zulapa (Reserve Lake) Prospect (Fort Hope Reserve): Au

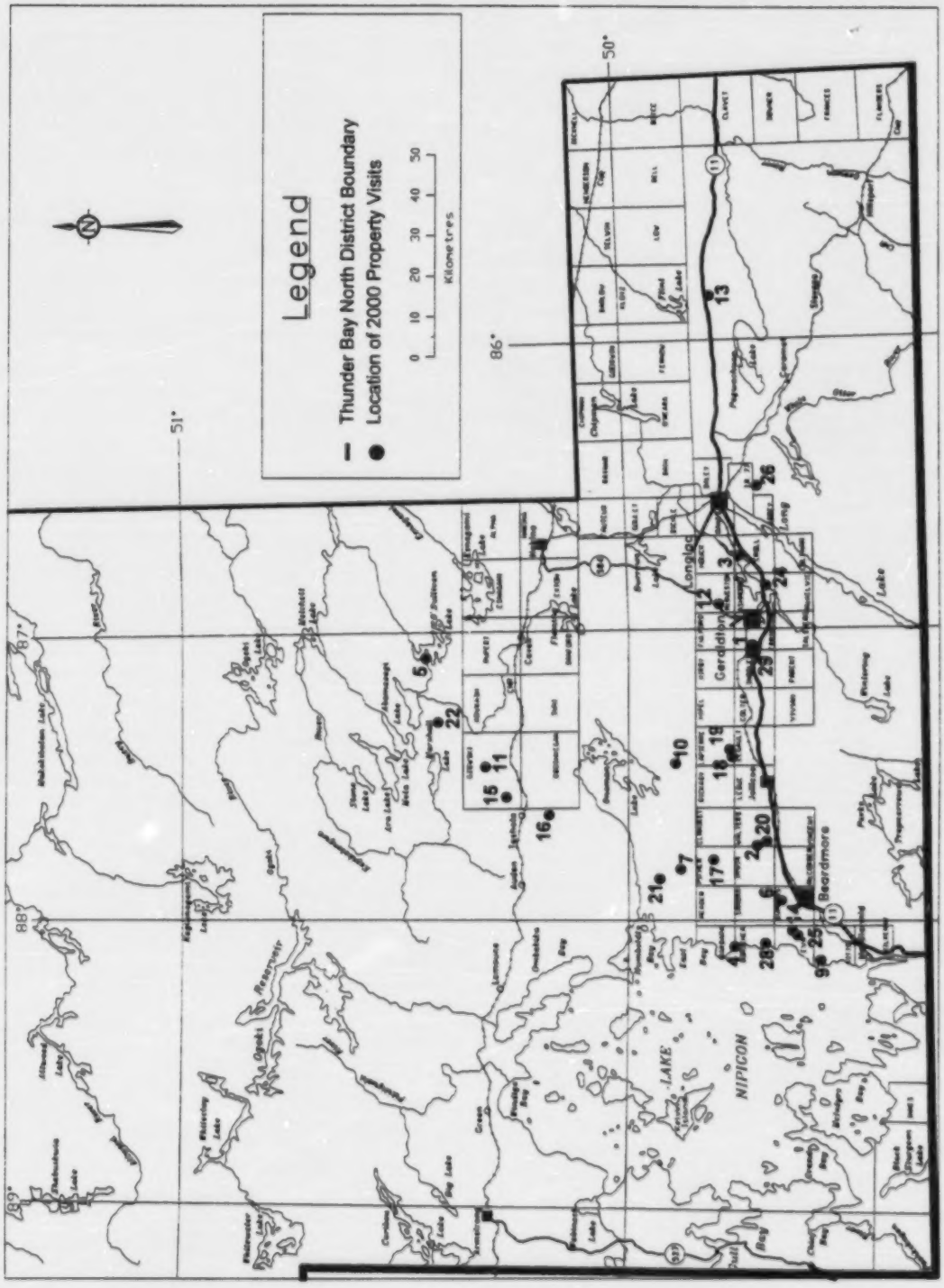

Figure 4. Thunder Bay North District (Southeast Map) Property Visits, 2000.

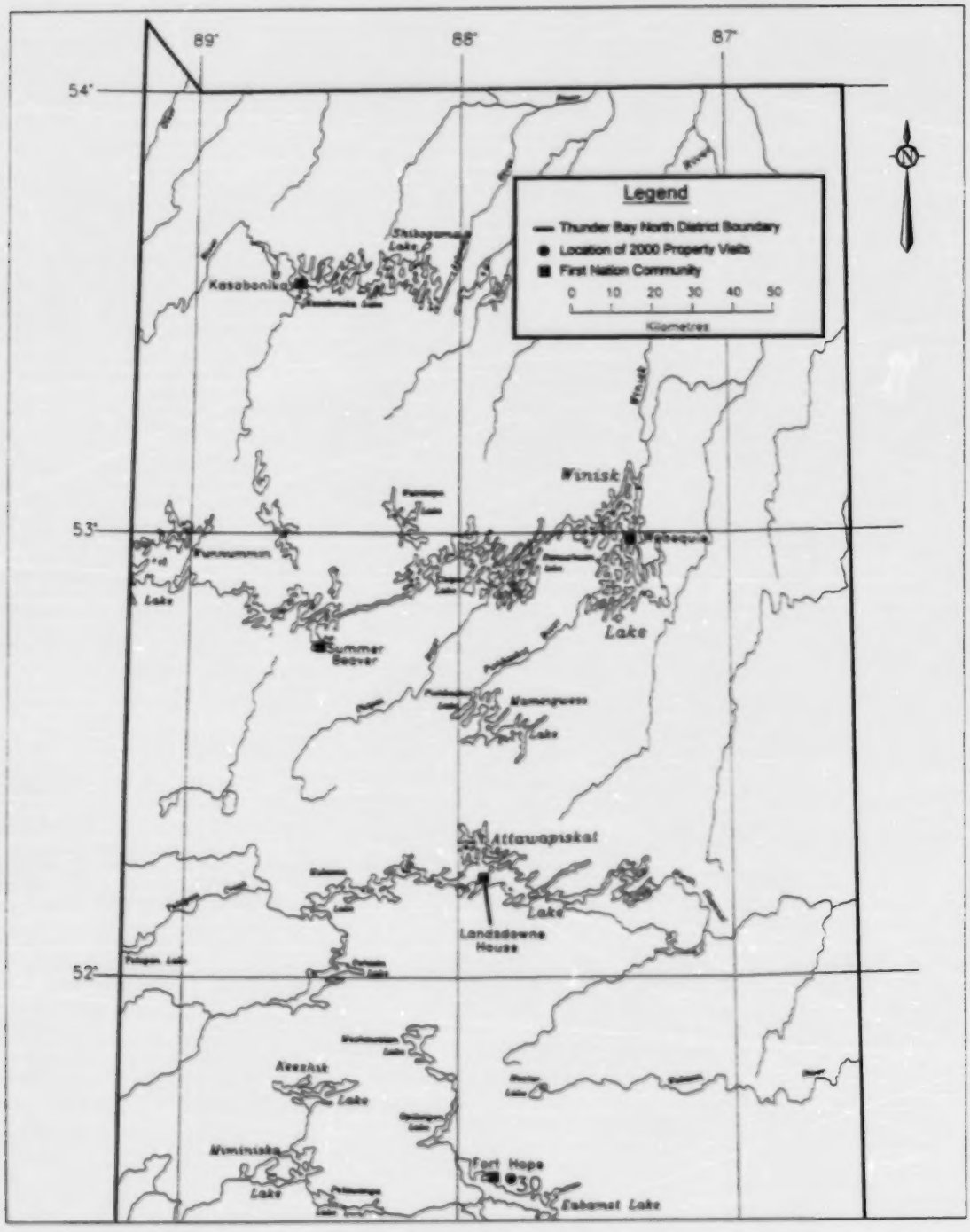

Figure 5. Thunder Bay North District (Northeast Map) Property Visits, 2000.

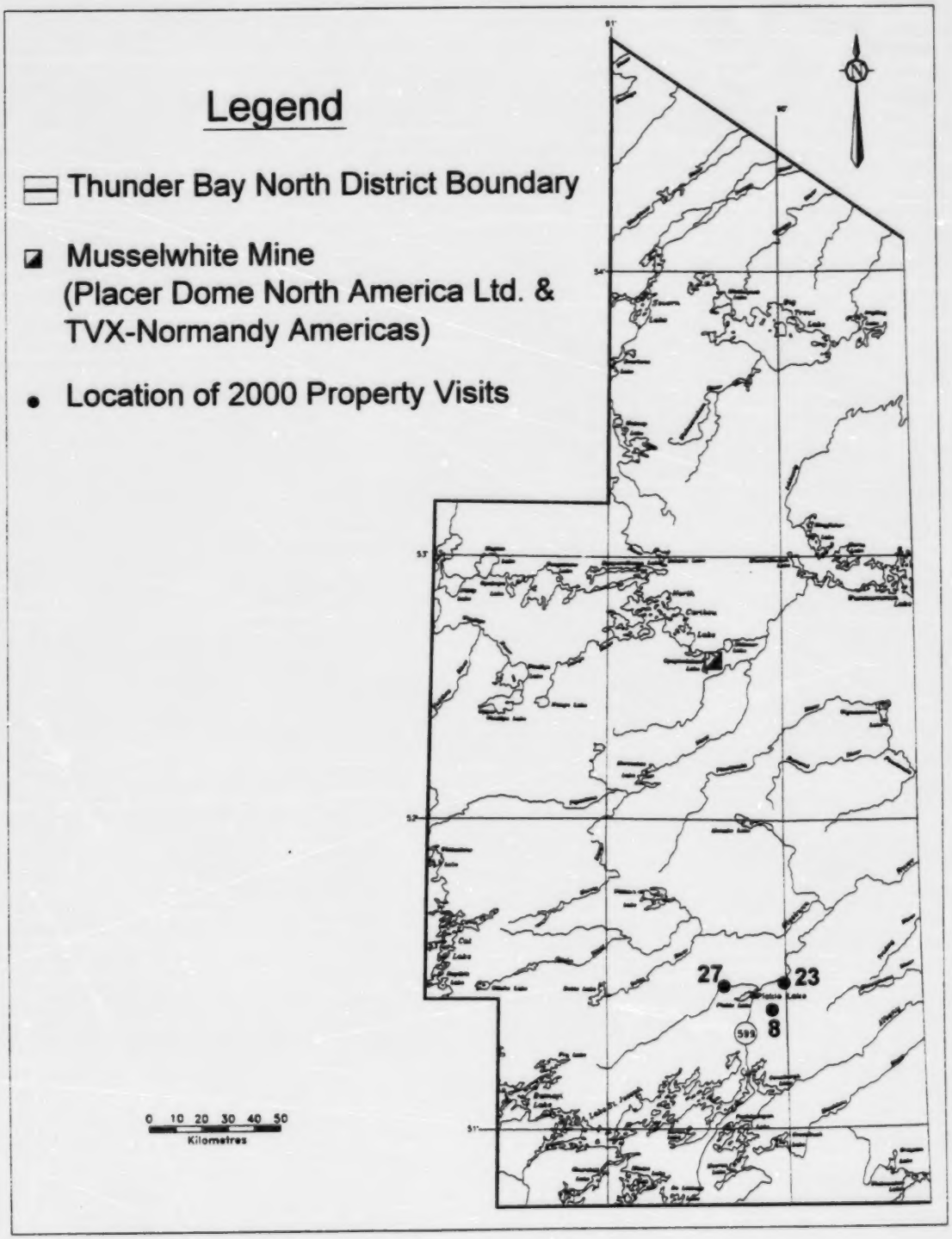

Figure 6. Thunder Bay North District (Northwest Map) Property Visits, 2000.

PROPERTY EXAMINATIONS

Gold

PICKLE CROW PROJECT

The Pickle Crow property is located 9.5 km northeast of Pickle Lake, Ontario. The property consists of 98 contiguous, patented mining claims controlled by Wolfden Resources Inc. (90%) and Jonpol Explorations Ltd. (10%). Cantera Mining Ltd. has an agreement with the owners to surface bulk sample/mine for the first 100 m to depth. Advanced exploration, including stripping and bulk sampling, took place on the No. 1 vein or Howells vein, No. 5 and Riopelle veins in 2000. Battle Mountain Gold, Hemlo was scheduled to custom mill 9160 tonnes of gold ore. The Pickle Crow property is accessible by road east of Highway 599.

The Howells (No. 1) vein of Pickle Crow Gold Mines Limited was discovered in 1928. H.H. Howell and J. McFarlane, on behalf on Northern Aerial Minerals Limited (N.A.M.E.), staked 57 claims comprising 2536 acres. Initially an eastern and western group was staked and then an intervening group was staked to form a contiguous block. The Howells vein, on which the Pickle Crow orebody was developed, was trenched and diamond drilled in 1929 (10 drill holes). M.E. Hurst systematically mapped the Pickle Lake area in 1929 (Hurst 1930).

In 1933, a steam plant was installed and shaft sinking commenced following financing by J.E. Hammel. Pickle Crow Gold Mines was organized in 1934 and purchased the property from Northern Aerial Canada Golds Limited, successor to N.A.M.E. By 1935, a 125-ton mill was constructed, which was expanded to a 400-ton complex by 1937. The shaft was sunk to 2000 feet and 9 levels were developed by 1938. J.E. Thomson mapped the bedrock geology in 1936 and 1937 for the Ontario Department of Mines (Thomson 1938).

Ferguson, Groen and Haynes (1971) summarized underground development and exploration:

Shaft	Inclination	Claim No.	Collar depth in feet	Vertical depth below surface in feet	No. of developed levels
No. 1	vertical	Pa747	surface	3,042	19
No. 4	vertical	Pa747	2,900	4,038	7
No. 2	vertical	Pa2071	271	1,518	3
No. 3	vertical	Pa2062	surface	3,052	21
Albany*	vertical	Pa64	surface	652	5

* Albany shaft completed by Albany River Mines Ltd. before it was acquired by Albany River Gold Mines Ltd. in July 1938. Lateral development by both companies totals 8,223 feet. Taken over by Pickle Crow group in 1946. Lateral development in Pickle Crow shafts is 134,166 feet. Surface drilling of 181 holes totaling 81,349 feet and 3,400 underground holes totalling 449,000 feet.
Initial mill capacity 125 tons increased to 400 tons in 1938.

Pickle Crow Gold Mines was acquired and controlled by the Keevil Mining Group (Teck Corporation) in 1958.

The Pickle Crow Mine operated from 1935 to 1966 and produced 1 446 214 ounces of gold and 168 757 ounces of silver from 3 070 045 tons of ore. Average ore grade was approximately 0.52 ounce per ton gold (Watts, Griffis and McQuat 1993).

Ferguson (1966) published a compilation of the Pickle Crow Gold Mines Limited property for the Ontario Department of Mines. Pye (1976) published a compilation of the Crow River area.

Watts, Griffis and McQuat (1993) summarized the post production exploration period on the Pickle Crow Gold Mine:

> Between 1981 and 1984, Gallant Gold Mines and Golden Shadow Resources Inc. carried out exploration including 25,000 feet of drilling on the Central Patricia, Pickle Crow and Crowshore properties. In 1985, Highland Crow Resources Ltd. acquired the property and commenced an extensive exploration program that was taken over by Noramco in 1987. The exploration program from 1985 to 1988 included over 100,000 feet of drilling in more than 250 surface holes, various geophysical surveys, stripping and mapping. In addition to the surface program in 1987, the Pickle Crow mine was dewatered from the No. 1 shaft to access the 750 level. The No. 1 shaft was rehabilitated to allow underground drilling of approximately 30 holes and mapping of workings in the No. 1 and No. 5 vein areas. The program was completed in July, 1988 and the mine was allowed to flood.
>
> During 1988 a production feasibility study was undertaken by Brampton Mining Services and Noramco and a number of scenarios were considered. The decision was reached not to proceed on the basis of the perceived ore reserves, though further exploration was considered justified. Exploration continued at the Pickle Crow property with the emphasis on vein structures in the No. 3 shaft and Albany shaft areas.

The Pickle Crow property is located in the central portion of the Uchi Subprovince of the Superior Province.

Stott et al. (1989) described the supracrustal rocks of the Pickle Lake area:

> This metavolcanic belt is dominated by massive to pillowed basaltic flows (Unit 1). The rocks are typically fine grained, but coarse-grained flows are locally prominent, notably east of the Ochig Lake Pluton on the Dona Lake gold property, which is held by Placer-Dome Incorporated. Dacitic to andesitic tuff and flow rocks (Unit 2) are observed south of Pickle Crow, along the southeastern side of the belt, and in the Kasagiminnis Lake area. Lapilli and bomb size clasts are only locally observed south of Pickle Crow and on Kasagiminnis Lake. Felsic pyroclastic rocks (Unit 3) are scarce and occur associated with the major units of intermediate metavolcanics.
>
> Long, continuous marker units of magnetite-chert ironstone, interbedded with greenish mudstone (Unit 4), occur most typically within the mafic metavolcanics. Ironstone also occurs locally within intermediate tuff (Unit 2) near the eastern margin of the belt.
>
> The interbeds of greenish mudstone and local graphitic schist associated with the ironstone units are extensively ferroan dolomitized in the vicinity of the village of Central Patricia and the former settlement of Pickle Crow. This alteration is spatially associated with pervasive carbonatization of the volcanic rocks.
>
> Very few clastic metasediments (Unit 5) are observed in this belt apart from units in the southern part of the map area, east of Kasagiminnis Lake and on Highway 599 (Figure 2).
>
> Within the metavolcanic assemblage, gabbroic sills (Unit 6) are not easily distinguished from coarse basaltic flows. A large gabbroic intrusion lies adjacent to the northern end of the belt, southwest of Collishaw Lake. Gabbroic and ultramafic intrusive sheets occur north of the Pickle Lake Stock and host the copper-nickel deposit at the Thierry Mine. Very little is known about the circular Kibler Lake Stock that intruded into the Tarp Lake Pluton. Sage and Breaks (1982, p.193-194) report that the outer part of this apparently multiphase or layered intrusion with a donut-shaped aeromagnetic signature (ODM-GSC 1960) is at least locally composed of magnetite-rich melanocratic diorite.
>
> Lenticular quartz porphyry intrusions (Unit 7) occupy a significant volume of the stratigraphy in the Central Patricia-Pickle Crow area. These bodies are all somewhat similar, with quartz eyes in a variably deformed and sericitized fine-grained matrix. The rocks are locally sheared and in places contain inclusions of mafic metavolcanics and ironstone.
>
> A schistose quartz- to quartz-feldspar porphyry intrusion lies east of the Kasagiminnis Lake Pluton and flanks a major unit of intermediate pyroclastic rocks. These pyroclastic rocks strike westward and may correlate with the intermediate metavolcanics of the Dempster Lake cycle observed at the northern end of Caley Lake, west of the present map area (see Stott and Wallace 1984; Stott and Wilson 1986).

The structural geology at Pickle Lake has been studied most recently by Stott et al. (1989):

Reliable top indicators are not widespread in the northwestern half of the belt. However, stratigraphic younging evidence in the southeastern half of the belt, outside of the tightly folded rocks in the Pickle Crow area, suggests that the regional younging direction of this part of the belt is southeastward toward the Seach-Achapi Lakes Granitoid Complex.

Mapping by Pye (1975) and earlier workers has defined large folds of the stratigraphy in the Pickle Crow area, and local younging evidence from pillowed basalts, confirm the earlier defined anticlines and synclines there (Pye 1975). However in other parts of the belt, the continuity of electromagnetic conductors and stratigraphic units, such as ironstone and intermediate tuff, suggests a simple stratigraphy on the regional scale with megascopic folding concentrated locally, for example, south of the Ochig Lake Pluton.

A single planar alignment of minerals, a schistosity which lies at a small angle to or parallel to the bedding, was observed in most areas of the belt. There are regional variations in the intensity of development of this schistosity. A weak flattening fabric is typical of the northwesternmost part of the belt along Highway 808. A moderate deformation appears to be most typical of other parts of the belt with notable exceptions. These exceptions include:

1. discrete deformation zones of strong to intense schistosity in the Pickle Crow area.
2. a triangular area of the belt, south of Ochig Lake Pluton, squeezed between several late plutons and bearing a highly constrictive strain where rocks in many places are almost purely lineated.
3. strong flattening fabrics in the supracrustal rocks enveloping the late to posttectonic plutons within the belt.

This latter example is well illustrated by the strongly flattened and banded amphibolite on the Thierry Mine Road along the northern margin of the Pickle Lake Stock.

In general, the oldest observed strain element in the belt appears to be an easterly to north-northeasterly plunging stretching lineation which characterizes most of the northern and eastern parts of the belt (Figure 4). This region, termed Domain 1, is mainly flanked to the southeast by the tonalite terrain of the Seach-Achapi Lakes Granitoid Complex. Domain 1 includes the Pickle Crow area and mineralized deformation zones. The gold-quartz veins in these deformation zones are folded and typically possess steep northeasterly plunging lineations. This gold mineralization is localized along discrete shear zones, some of which are folded. These shear zones formed at a low angle to the flattening schistosity, concomitant with the deformation that characterizes this domain.

The structural setting that has prepared the mafic volcanic rocks for gold mineralization is described by Stott et al. (1989):

Major parts of the belt are dominated by contact strain aureoles imposed by the emplacement of late tectonic intrusions. Experience in other greenstone belts (Stott and Wilson 1986) suggests that, although there is a general decrease in the intensity of deformation outwards from these plutons, considerable variations in strain intensity can occur within these aureoles, and that localized shear zones, as well as tight folds and fracture systems, commonly form as part of such deformation. Zones of intensely developed schistosity can occur adjacent to, or within, comparatively more competent lithologies, such as porphyry intrusions and banded ironstones, and comparatively less competent lithologies, such as intermediate tuff units. It is not generally possible to predict whether and where such zones will develop within contact strain aureoles. Their association, however, with the rise of granitoid intrusions means that the recognition of the relative timing of the intrusions and the breadth of their surrounding contact strain aureoles is economically important.

Shear zones formed along conjugate fractures at a low angle (typically 15°) to the principal flattening schistosity. Very locally, both members of a conjugate set may form as narrow shears, but in general, only one member of the set appears to develop into a significant shear zone in any one locality. This appears to be the case at the Pickle Crow Mine. Many of the major shear zones that host auriferous quartz, tourmaline, and sulphide mineralization veins are slightly oblique to the main northeast-striking flattening schistosity in this structural domain (Domain 1, Figure 4). In many cases, these zones are folded, and in all cases they contain asymmetrically folded quartz veins. The asymmetry of folds in these cases is consistent with conjugate fracturing, shearing, and concomitant rotation toward the flattening plane during the major shortening event that produced the Domain 1 schistosity and stretching lineations.

Similar observations have been made by Wilson et al. (1985) across the Red Lake Belt. They recognize conjugate fractures and shear zones as structural elements formed during subhorizontal flattening of the supracrustal rocks by adjacent plutons. The principal shear zones and vein systems at the Pickle Crow Mine, including Howell vein, the Riopelle, and No. 5 veins and the "D" zone (Pye 1976, p.171), conform to a model of conjugate fracturing during

northwestward-directed shortening of the supracrustal rocks. This may have occurred during expansion of the tonalitic mass to the southeast of the belt in the Seach-Achapi Lakes Granitoid Complex. It may eventually be shown with further study that these auriferous conjugate shear zones, so well developed in the Pickle Crow area, are related to the pervasive iron carbonatization in this area at the time of deformation in the Red Lake Belt.

Cantera Mining Ltd., as part of an advanced exploration program preliminary to bulk sampling, has stripped approximately 150 m east of the #1 shaft on the #1 or Howells vein. The #1 vein is a crack-seal tourmaline, sericite, chlorite quartz vein averaging less than 0.5 m in width and displaying visible gold. Host rocks are massive to pillowed mafic metavolcanics and banded iron formation proximal to the shaft collar. The vein strikes northeasterly but at the most eastern portion of exposure is tightly folded, a result of an apparent shortening event. Previous drilling by Pickle Crow Gold Mines and Noramco has suggested two veins existed but stripping has revealed one complexly folded vein is present. Sigfusson Northern, under contract to Cantera Mining Ltd., planned extraction of 9160 tons of ore from the Pickle Crow property. A three-stage blasting (modified Avoca Method) was employed to surface mine the east portion of the #1 vein. Metavolcanic host rocks were drilled and blasted within 1.5 m of the vein, secondly, the 1.5 m scab was drilled and blasted, and thirdly, the quartz vein was blasted.

The Riopelle vein, located in the southwest portion of the property, is a very tightly folded crack-seal vein intruding mafic metavolcanics. Tourmaline, sericite, ankerite, pyrite and visible gold occur in the vein.

A small stockpile at the #5 vein, where 490 tonnes were previously bulk sampled (0.56 ounce per ton gold) was incorporated in the phase two bulk sample of 9160 tonnes for shipment to Battle Mountain Gold, Hemlo for custom milling.

Banded carbonate, chert, iron formation proximal to the shaft collar of the #1 shaft was previously drilled by Noramco, who encountered 100 feet of 0.40 ounce per ton gold. This zone may be targeted for future exploration and development.

PGE

There are a significant number of Archean and Proterozoic PGE deposits distributed throughout the Thunder Bay North District (Table 4). Three areas, Thierry Mine, Final Lake and Onaman-Tashota, which were visited in the 2000 field season are featured here.

THIERRY MINE

The Thierry Mine is located approximately 8 km west northwest of Pickle Lake, Ontario. The property consists of 11 538 acres of mining leases and staked claims, held by PGM Ventures Inc. (formerly Icelandic Gold Corporation). Icelandic Gold Corporation purchased the property in November 2000 from Etruscan Resources Inc. The Thierry Mine property is accessible by an all-weather mine road from Highway 599 located immediately north of Pickle Lake.

Exploration history dates back to 1946 when following the discovery of a mineralized float, Central Patricia Gold Mines Limited conducted a ground magnetic survey, trenching and diamond drilling (18 holes – 4144 feet) between 1946 and 1950. The J&I copper-nickel zone was discovered. Kapkichi Nickel Mines Limited acquired the property in 1956 and conducted a ground magnetic and electromagnetic survey.

Table 4. PGE targets in the Thunder Bay North District in 2000.

Property/Deposit Name (Location)	Owner	Geology/Mineralization	Age	Reserves/Assays
Big Trout Lake	Platinex Inc. (Jim Trusler) (Lorne Burden)	Layered gabbro - 35 km long intrusion	Archean	Chromite layers, PGE assays
Caramat Lake (Pic River)	Onesime Albert	Large gabbro and diabase dike	Proterozoic	5.18% Cu, 1.45% Ni on grab samples. PGE?
Cote Float (Geraldton)	St. Anthony Resources-TLC Resources Inc.	Disseminated cpy, po in medium- to coarse-grained gabbro		>1 g/t PGE
Deeds Creek	Nolan Cox	Semi-massive cpy, po, py	Archean	
Eva-Kitto Townships (Lake Nipigon)	Maple Minerals Inc.-East West Resources	Ultramafic intrusion - 6 km (in diameter) ring dike or cone sheet - peridotite to ol. gabbro	Proterozoic	PGE-TBD
Final Lake (Jellicoe)	Nolan Cox-Lyle Holt	Gabbro/ultramafic intrusions	Archean	0.3->1 g/t PGE (grab samples)
Jacobus Deposit (Beardmore)	NWT Copper Mines (Nolan Cox)	2 to 5% disseminated cpy, po, py in Pinel Lake gabbro intrusion	Archean	1 MT @ 0.94% Cu+Ni - low to unknown PGE
Juneau Lake Deposit (Lake Nipigon)	Landore Resources Inc.-Brancote Holdings	Massive sulphide consisting of po with minor cpy, po, pent., mag associated with large anorthositic gabbro sill	Archean	2.2 MT @ 0.87% Ni, 0.59% Cu, prel. PGE assays >1 g/t
Lamaune Lake Occ.	Norcal Resources Ltd.	Diss. to semi-massive py, cpy, po in gabbro and peridotite/pyroxenite	Archean	0.89 g/t Pt, 0.88 g/t Pd on grab samples
Lavoie Lake Deposit (Lansdowne House)	PGM Ventures Inc. (Norman Brewster)	Disseminated cpy, po, py, po in layered anorthositic gabbro intrusion	Archean	14.6 MT @ 0.58% Cu, 0.37% Ni, PGE?
Linsey Bay Property	Ken Fenwick-Don Leishman	7 Cu-Ni occurrences on property, disseminated cpy, po, py in 600 m x 25 km anorthositic sill	Archean	2.3% Cu, 0.62% Ni, 0.26% Co, PGE?
Norton Lake	Open	Massive po, py in 8 m wide band in synform of volc. Sequence-gabbro	Archean	1 MT @ 0.72% Ni, 0.56% Cu, PGE?
Standingstone Lake (Beardmore)	John Ternowesky	Semi-massive po, py as lenses in mafic volc./gabbro contact	Archean	1.3 g/t PGE (grab samples), 1.08% Cu, 3700 ppm Ni
Sim Lake (Armstrong)	Whalen Resources (Jamie Wheeler)-Doug Thibault-Basil Smith	1 to 5% disseminated cpy, py, po in medium- to coarse-grained gabbro, some pegmatoidal/bx phases	Archean	>1 g/t PGE (grab samples)
Thierry Mine	PGM Ventures Inc. (Norman Brewster)	Semi-massive to massive sulphides	Archean	7 MT @ 1.88% Cu, 0.23% Ni, up to 0.30 opT Pd & 0.07 opT Pt
Tyrol Lake (Beardmore)	Pifher Resources Inc. (Gary Conn)	Mafic-ultramafic intrusions	Archean	Pending
Vista-Quest Lake Plugs		Small gabbro plugs, east portion of Sturgeon Lake belt	Archean	Sulphide mineralization including cpy has been noted
Weese Lake	Encampment Resources	Disseminated and patchy po, cpy, py in large gabbro intrusion	Archean	0.12 to 1.75% Cu, PGE to be determined

Abbreviations: bx, breccia; cpy, chalcopyrite; mag, magnetite; ol, olivine; pent, pentlandite; po, pyrrhotite; py, pyrite; volc, volcanic. MT, million tons; opT, ounces per ton; opt, ounces per tonne; g/t, grams per tonne

Kapkichi Nickel Mines Limited diamond drilled 8 holes totaling 4609 feet and discovered the G copper-nickel zone. In 1969, Union Miniere Exploration and Mining Corporation Limited (UMEX) optioned 12 claims from Kapkichi Nickel Mines Limited. UMEX conducted ground geophysical surveys and diamond drilled 60 holes outlining J&I, G and other sulphide leases. A key geophysical survey was extended to the north of Kapkichi Lake. Anomaly K2:1 was identified and drilled resulting in the discovery of a copper-nickel orebody that became the Thierry Mine. The initial hole located just south of Ponsford Lake intersected 25 feet of black, fine-grained biotite schist of which 20 feet were mineralized with grades of 1.24% copper and 0.14% nickel (Verbeek et al. 1972). Definition drilling outlined a 12 million ton deposit grading 1.6% copper and 0.18% nickel. In 1973, a shaft was collared and sunk to 1700 feet, subsequently followed by a decline to the 600-foot level. By 1977, two small open pits were mined to the 200-foot level and the mill was officially in production. Also in 1977, geophysical anomaly K1:1, located east of the mine, was diamond drilled. A 73 million ton deposit grading 0.39% copper and 0.11% nickel, down to 600 feet vertically, was drilled off with approximately 100 diamond drill holes (Patterson 1980). The Thierry deposit (K2:1) was mined from 1976 to 1982 with only minor production coming from a pit on the K1:1 deposit.

Production totals are the following: 967 043 lb. copper, 267 621 lb. nickel, 15 115 oz. platinum, 40 021 oz. palladium, and 14 689 oz. gold from 5.759 million tons of ore.

In the late 1980s, UMEX Inc. completed underground and surface exploration that, among other details, looked at the PGE content of the Thierry deposit. In 1990, Etruscan Enterprises Ltd. stated that the Thierry deposit had reserves of 7 million tonnes grading 1.88% copper and 0.23% nickel to a depth of 2500 feet and included significant concentrations of platinum group metals (Vancouver Stockwatch, July 12, 1990). PGM Ventures Inc. (formerly Icelandic Gold Corporation) acquired the Thierry Mine property in late 2000.

The Thierry Mine property is located within the Pickle Lake belt in the central portion of the Uchi Subprovince. Stott (1996) described the geology of the Pickle Lake belt:

> The Pickle Lake greenstone belt is dominantly composed of basaltic flows with some intermediate to felsic volcanic units concentrated in the southeastern part of the belt (Figure 11). Contrasts in U-Pb zircon ages from two felsic volcanic sequences and the geophysical evidence of a major fault boundary within the belt permits us to subdivide the Pickle Lake greenstone belt into three tectonic assemblages shown in Figure 12.
>
> The northern half of the belt, north of an aeromagnetic and electromagnetic discontinuity (Figure 12), has been labelled the Northern Pickle assemblage and might be correlatable in future with similar supracrustal rocks of the North Caribou greenstone belt in the Sachigo Subprovince. Basaltic strata in this portion of the Pickle Lake belt appear to continue northeastward to form aeromagnetic extensions or "tails" of the belt and conforming with the structural grain of enveloping tonalite gneisses.
>
> The southern half of the belt has been subdivided into two tectonic assemblages. The Pickle Crow assemblages of basalt, iron formation and local quartz porphyry units bears a U-Pb zircon age of 2860±2 Ma for a quartz porphyry (Corfu and Stott 1993b). This assemblage is in apparent structural conformity with a sequence of mafic and felsic volcanic rocks to the southeast that contains an ash-flow tuff with a U-Pb zircon age of 2836±3 Ma (Corfu and Stott 1993b). This age is between the ages of two felsic volcanic sequences (2842 and 2825 Ma) in the Woman assemblage of the Meen-Dempster belt. The Woman assemblage strata continue eastward to form a tail or extension of the belt, which compares in rock types with undated volcanic units that lie on strike further east in northern Miminiska-Fort Hope greenstone belt, separated by a granitoid terrain.

Sage and Breaks (1982) described the geology of the Thierry Mine property:

> The Thierry deposit occurs along the northwestern margin north of the Pickle Lake metavolcanic-metasedimentary belt, about 2400 m due north of the Kapkichi Lake deposits (Figure 13, Chart B, back pocket).

Previous geological mapping by Dyer (1934) and Duffell et al. (1963) erroneously indicated the contact of the metavolcanics and the granitic batholithic complex to straddle the northern shoreline of Kapkichi Lake. Recent detailed mapping and diamond drill compilation by C. Bowdidge and E. Reeve more definitively extended the southwest to west-southwest trending contact of the Pickle Lake belt respectively to an unnamed lake 6 km northeast of Minominatik Lake and Ponsford Lake. This contact approaches within 270 m of the Thierry deposit.

More specifically, the deposit occurs within a narrow "corridor" of foliated amphibolitized mafic metavolcanics which extends for 10 km west from just above Hook Lake to southwest of Ponsford Lake. This "corridor" narrows to approximately 700 m in vicinity of the Thierry deposit. Granitic rocks of the Pickle Lake Stock and possibly of the Dobie Lake batholithic complex respectively bound the metavolcanic "corridor" to the south and north.

Patterson (1980) described the geology of the Thierry deposit:

The Thierry mine is located in ultramafic and metagabbroic blocks which have been sheared in a mylonitized zone. The um-m rocks are mafic metagabbro, talc-carbonate schist, olivine-tremolite-chlorite rock and metagabbro. Remnant igneous mineralogy of the metagabbro is plagioclase (An_{50}-Ans_{60}) and clinopyroxene with exsolved ilmenite. These alter to a mixture of hornblende and plagioclase. Clinopyroxene-rich gabbro alters to mafic metagabbro; plagioclase-rich alters to metagabbro. The talc-carbonate schist was originally dunite and the olivine-tremolite-chlorite rock, a peridotite. The metagabbro and mafic metagabbro are gradational into each other but the relationship of the talc-carbonate schist and the olivine-tremolite-chlorite rock to the mafic metagabbro and metagabbro is unknown. Shearing of these um-m rocks has produced hornblende-chlorite-biotite schist, a protoblastomylonite which is continuous throughout the length of the mine (2000 metres). The mylonite often includes large blocks of relatively undeformed amphibolite schist, mafic metagabbro, metagabbro and diorite.

Sage and Breaks (1982) described the mineralization of the Thierry deposit:

The mineralization is largely confined to a major shear zone, consisting dominantly of very fine-grained biotite-chlorite-hornblende ultramafic schists. The above three minerals are modally variable and generally the rock contains meager plagioclase. The grain size is usually less than 1 mm.

To a lesser extent, mineralization occurs within associated, relatively less intensely deformed, altered lenses of peridotite and gabbro, distributed along the footwall.

The largest such mass is about 240 m in length and 120 m in breadth, described by Verbeek et al. (1972, p.139) as a "tremolite-chlorite rock with diablastic texture, carrying abundant magnetite, a little ilmenite, and local traces of sulphides, mainly pyrrhotite." A smaller ultramafic body occurs at the west end of the mineralized shear zone "varying from light green tremolite-chlorite rock to darker green actinolite rock, which grades into metagabbro, consisting of hornblende and plagioclase with blastophitic texture" (Verbeek et al., 1972).

The shear zone is apparently conformable to well foliated to schistose and lineated amphibolitic mafic metavolcanic wall rocks. Examination of the small scraped outcrop northwest of the shaft disclosed the subtle presence of deformed pillow structures within fine-grained to medium-grained light blue-green (weathered surface) amphibolitized mafic metavolcanics. Selvedges up to 5 mm in thickness appear somewhat darker on weathered surfaces being mainly composed of hornblende and biotite, slightly coarser-grained than the pillow interiors.

Near the surface the Thierry deposit is composed of one continuous mineralized zone, approximately 980 m in length and varying up to 30 m in width. The mineralized zone, at the time of writing, was open at depth along most of its length as surface diamond drilling penetrated to about 240 m and to 450 m along one section (C. Bowdidge, UMEX, personal communication). Below 150 m between sections 30E and 36E, the deposit becomes segmented into two zones of roughly equal extent, and somewhat different mineralized character. The northeastern part is a biotite-chlorite-hornblende schist with the sulphides occurring as tiny concordant stringers. In the southwestern segment the ultramafic rocks, in general, are less schistose with the sulphides concentrated in massive stringers separated by disseminated or barren zones (C. Bowdidge, UMEX, personal communication).

The primary sulphide minerals, listed in order of approximate decreasing abundance, are pyrrhotite, chalcopyrite, pyrite and pentlandite. Both violarite and mackinawite have developed as alteration products of the pentlandite. Smythite and millerite respectively occur as inclusions in pyrrhotite and as fine lamellae in chalcopyrite. Magnetite and minor ilmenite are additionally present. Combined volume of sulphide and oxide comprises about 15 percent of the rock. A crosscut on the 180 m level intersected a zone of disseminated bornite in amphibolite (C. Bowdidge, UMEX, personal communication). The initial underground development work indicated by a substantially higher grade of mineralization than indicated by the diamond drilling program (C. Bowdidge, UMEX, personal communication).

Additional significant mineralization is contained within the flanking, relatively undeformed ultramfic lenses, particularly at the western end of the main mineralized zone. Sulphides principally occur in this situation as irregular masses and blebs, also averaging approximately 15 percent by volume of the rock.

PGE potential is significant on the Thierry property. Patterson (1980) indicated the mill head grade over approximately a one-year period was 0.005 ounce per ton platinum and 0.015 ounce per ton palladium. Patterson (1980) reported PGE assay values from grab samples from within the mine workings range from 0.005 to 0.298 ounce per ton platinum and from 0.009 to 0.327 ounce per ton palladium.

Three other mineralized zones are known in the Kapkichi Lake area, proximal to the Thierry (K2:1) deposit and associated with mafic to ultramafic sills and dikes:

1. K1:1 deposit totalling 55 million tonnes at 0.31% copper and 0.01% nickel.
2. Kapkichi "G" totalling 7.5 million tonnes at 0.41% copper and 0.10% nickel.
3. Kapkichi "J" totalling 37 million tonnes at 0.40% copper and 0.12% nickel (platinum and palladium values are not known).

FINAL LAKE PGE OCCURRENCE

The Final Lake PGE occurrence is located approximately 45 km northeast of Beardmore and 3 km north of central Lapierre Township. Access to the property is via the Kinghorn Road, which intersects Highway 11 7.5 km east of Jellicoe, by proceeding north for approximately 15 km to the start of the Altitude-Fullerton Lake Road and continuing north-northwest for a further 14.5 km to the road's termination at Final Lake. Beardmore prospectors N. Cox and L. Holt have staked 13 contiguous claims (43 units in total) covering an area along a northwest-trend centred on Final Lake. To date (November 2000), only a limited amount of prospecting, stripping, trenching and sampling have been conducted by the property owners, restricted primarily to the southeast portion of the claim group (TB 1232571 and TB 1240497). Staff of the Thunder Bay Resident Geologist office visited what is known as the East Pit on claim TB 1232571 in October 2000.

Past activity on the current property and the immediate surrounding area was focused on base metal (Cu, Pb, Zn) and gold exploration. A brief compilation of all past exploration work and significant results related to PGE-Cu-Ni mineralization is given as follows (Assessment Files, Thunder Bay North, Thunder Bay):

1968: Noranda Exploration Company Limited conducted a ground magnetometer and EM survey over a 14-claim block surrounding Final Lake. Results indicated strong coincident anomalies (along a northwest trend) over "areas of visible copper-nickel mineralization" (Cross 1968). Drilling and trenching were recommended.

1970: Canadian Nickel Company Ltd. diamond drilled several shallow holes (30 m) on current claim TB 1240494 in the Oasis Lake area. Zones of gabbro and amphibolite contain seams of 70% pyrrhotite and disseminations of up to 3% pyrrhotite and chalcopyrite.

1971: Hudson Bay Exploration and Dev. Co. Limited conducted diamond drilling in 3 holes over 2 grids south of Altitude Lake, 2.5 km east of the present claim group. Intersections of "coarse-grained, dark green banded andesite" (Vowles 1971) containing up to 10% pyrrhotite, pyrite and chalcopyrite were described.

1973: Amax Exploration, Inc. (Altitude Group) completed an integrated program of geological mapping, geophysics and diamond drilling over a 6-claim block, southwest of Altitude Lake

(present claim TB 1240497). Two diamond drill holes were completed over a strong coincident magnetometer-EM anomaly across the central portion of the property. Sulphide zones ranging in width from 2 to 4 m, containing "mafic bands of chlorite and hornblende" (Steers 1973) and averaging 5 to 20% pyrrhotite, pyrite and chalcopyrite (as high as 90%) were delineated.

B.B.M. Investments Limited diamond drilled 2 holes at the west end of Final Lake on current claims TB 907640 and TB 907643. Intersections of up to 22 m (73 feet) of massive medium-grained metagabbro and amphibolite containing 2% pyrrhotite were encountered.

1987: Coulson Exploration Inc. completed an airborne magnetic survey over the Final-Oasis-Eastbrook lakes area. Several zones of strong magnetic anomalies were delineated, in particular, south and west of Final Lake along a northwest trend.

1988: Aerodat Limited of Toronto flew a large magnetic-electromagnetic survey covering the Tashota-Geraldton greenstone belt for the Ontario government. A region of intense magnetic highs and coincident first and second order EM anomalies exist along a northwest trend across the Final Lake area.

1992: R. Davies of Toronto, under two Ontario Prospector Assistance grants, conducted a detailed soil geochemistry and geophysical program over a claim group southeast of Altitude Lake, approximately 2 km east of the Final Lake PGE property. Significant anomalous Cu-Ni-Co values were obtained in till samples along a well-defined ground EM conductor that extends southeast from Altitude Lake to Bieber Lake. A property report (Davies et al. 1993) states that "...the conductor is strong and characteristic of a zone containing massive sulphides" and is "identified to be the likely extension of a conductive zone previously drilled by Hudson Bay Exploration and Dev. Co. Limited (1971) in the Bieber Lake area".

The Final Lake PGE property (Figure 7) occurs at the granite-greenstone boundary between the Onaman Lake pluton and metavolcanic rocks within the southeastern portion of the Onaman-Tashota belt of the Wabigoon Subprovince. Mapping in this area by the Ontario Geological Survey (Kresz 1991) has delineated a unit of medium- to coarse-grained gabbro (pegmatitic in places) and amphibolite, which appears to widen along a northwest trend in the Final Lake area. This unit correlates well with strong coincident magnetometer and EM anomalies obtained from the 1988 Ontario government Aerodat survey. It is important to note that no detailed mapping has been conducted along this trend in the northwest portion of the claim group. Analysis of samples collected by both the property owners and staff of the Thunder Bay Resident Geologist office, from what is known as the East Pit (TB 1232571), ranged as high as 1.47 g/T Pt, 0.25 g/T Pd, 0.12% Cu and 0.24% Ni. As mentioned previously, all recent work, including sampling, has been limited to the southeastern portion of the property. Host rock observed in this area consists of medium- to coarse-grained hornblende gabbro containing up to 1% disseminated very fine-grained pyrite, chalcopyrite and pyrrhotite.

Anomalous PGE results obtained in recent sampling from a relatively small area of the Final Lake property, reported copper-zinc mineralization from past exploration, and the apparent widening northwestern portion of this mafic intrusive unit following coincident magnetic and electromagnetic anomalies, make this area a prime target for future PGE exploration.

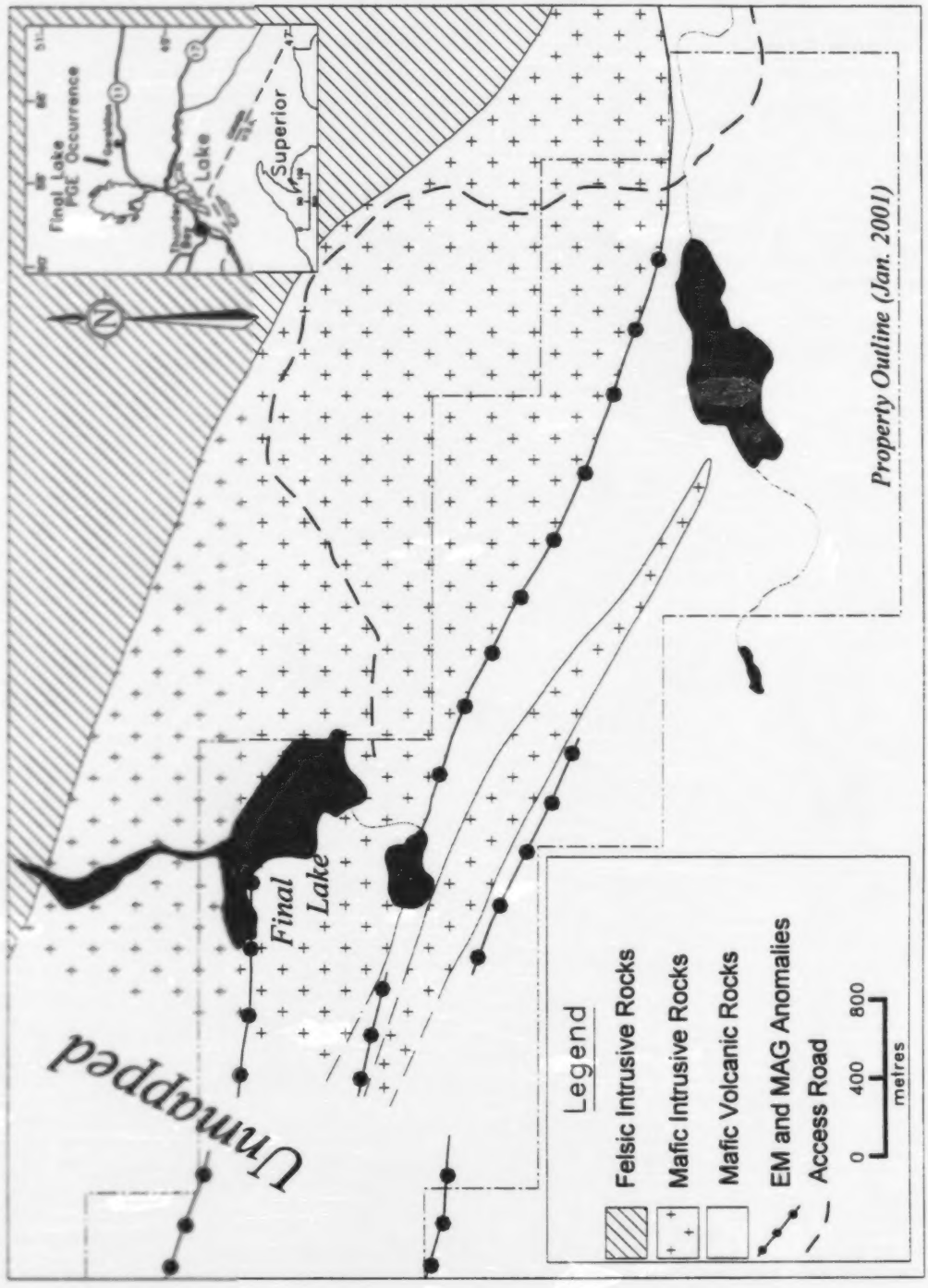

Figure 7. Final Lake PGE Occurrence (modified after Kresz 1991).

ONAMAN-TASHOTA BELT

There are several mafic and ultramafic intrusions that have potential PGE mineralization in the Onaman-Tashota Belt, Wabigoon Subprovince, including the three larger mafic intrusions in the Conglomerate Lake area. They are the Crooked Green Lake, Castlewood Lake, and Onaman River Confluence intrusions. The mafic sills and marginal phases of felsic plutons in the Gzowski Lake area are also prospective targets for PGE mineralization.

Crooked Green Lake Intrusion

G.M. Stott conducted a reconnaissance geological mapping program in the Onaman-Tashota area in 1995 (Stott et al. 1996). The Conglomerate Lake area was mapped by S.E. Amukun in 1976 (Amukun 1977). Previously, W.W. Moorhouse mapped the area in 1937 to complete the ODM reconnaissance mapping of the gold camps east of Lake Nipigon. L.F. Kindle had mapped the adjoining area to the north in 1930 (Kindle 1931), and H.C. Laird had mapped the adjoining area to the south in 1935.

The southern limit of the Crooked Green Lake intrusion is located 27.5 km north of Highway 11 on the Auden Road (Highway 801). The intrusion is circular in shape with a diameter of some 7 km.

Archean plutonic, metavolcanic and metasedimentary rocks of the Wabigoon Subprovince underlie the Crooked Green Lake area. The Crooked Green Lake intrusion is a composite mafic intrusion consisting of hornblende gabbro and quartz diorite (Amukun 1980a). In general, the Crooked Green Lake intrusion is gabbroic in the southern 2/3 and dioritic in the northern 1/3; accordingly, the southern portion of the intrusion is most prospective for PGE mineralization. The magnetic features depicted on maps 81305 (OGS 1989) and 2136 (ODM-GSC 1962a) support this observation.

No. on Figure 8	Sample Field Name	ELEMENTS ANALYZED					
		Au (ppb)	Ag (ppm)	Cu (ppm)	Ni (ppm)	Pt (ppb)	Pd (ppb)
1	Gabbro			476	107	ND	ND
2	Gabbro			76	56	ND	ND
3	Gabbro			84	150	ND	ND
4	Gabbro			205	246	1	ND
5	Quartz diorite	ND				ND	ND
6	Gabbro	ND				ND	ND
7	Gabbro	ND				ND	ND
8	Gabbro	ND				ND	ND
9	Gabbro	18				10	13
10	Hornblendite	ND				ND	ND
11	Diorite	ND				ND	ND
12	Silicified volcanic	10				16	18
13	Gabbro	ND				ND	ND
14	Gabbro	ND				ND	ND
15	Hornblendite	ND				ND	ND
16	Diorite	5				12	15
17	Feldspar porphyry	ND				ND	ND
18	Feldspar porphyry	ND				ND	ND
19	Gabbro	ND				ND	ND
20	Gabbro	ND				ND	ND
21	Gabbro breccia	ND				ND	ND
22	Gabbro	ND				ND	ND

No. on Figure 8	Sample Field Name	ELEMENTS ANALYZED					
		Au (ppb)	Ag (ppm)	Cu (ppm)	Ni (ppm)	Pt (ppb)	Pd (ppb)
23	Gabbro	ND				ND	ND
24	Gabbro	ND				ND	ND
25	Diorite	ND				ND	ND
26	Diorite	ND				ND	ND
27	Diorite	ND				ND	ND
28	Gabbro	ND				ND	ND
29	Gabbro	ND				ND	ND
30	Gabbro	ND				ND	ND
31	Gabbro	ND				ND	ND
32	Gabbro	ND				ND	ND
33	Gabbro	ND				ND	ND
34	Quartz diorite	ND				ND	ND
35	Leucogabbro	ND				ND	ND
36	Gabbro	ND				ND	ND
37	Vari-textured gabbro	ND				ND	ND
38	Hornblendite	ND				ND	ND
39	Gabbro breccia	ND				ND	ND
40	Altered diorite	ND				ND	ND
41	Gabbro	ND				ND	ND
42	Gabbro breccia	ND				ND	ND
43	Hornblendite	ND				ND	ND
44	Gabbro	ND				ND	ND
45	Mineralized gabbro	6	4	256	57	ND	ND
46	Gabbro	ND	4	81	38	ND	ND
47	Magnetic hornblendite	9	4	170	37	ND	ND
48	Diorite	ND	3	31	39	ND	ND
49	Altered hornblendite	ND	4	53	85	ND	ND
50	Diorite	ND	4	9	68	ND	ND
51	Gabbro	26.96				ND	ND
52	Gabbro	7.96				ND	ND
53	Gabbro	5.30				0.92	ND
54	Diorite	2.28				ND	ND
55	Diorite	2.32				ND	ND
56	Diorite	3.61				ND	ND

Due to increases in the prices of platinum and palladium, prospective geology, and a distinct lack of previous exploration in the Crooked Green Lake area, a sampling program was undertaken by Resident Geologists Program staff over the past 3 field seasons. A total of 56 grab samples were collected and analyzed for platinum and palladium; some of these samples were also analyzed for gold, copper, nickel and silver. Locations of these samples are depicted as dots on Figure 8. Despite the low amounts of PGE detected in these samples (see table above), geophysical and lithological characteristics indicate six unsampled areas of the intrusion that are recommended for mineral exploration:

Figure 8 Designation	Location	Rationale
A	~1 km east of North Wind Lake	- moderate mag. high, unmapped margin of intrusion
B	~1.7 km east of North Wind Lake	- strong mag. high, vari-textured gabbro
C	Northwest of Alma Lake	- strong mag. high, unmapped margin of intrusion
D	East of Alma Lake	- moderate mag. high, margin of intrusion
E	~2.5 km east of Crooked Green Lake	- moderate mag. high, north-south lineament
F	~1 km southeast of Crooked Green Lake	- moderate mag. high, margin of intrusion

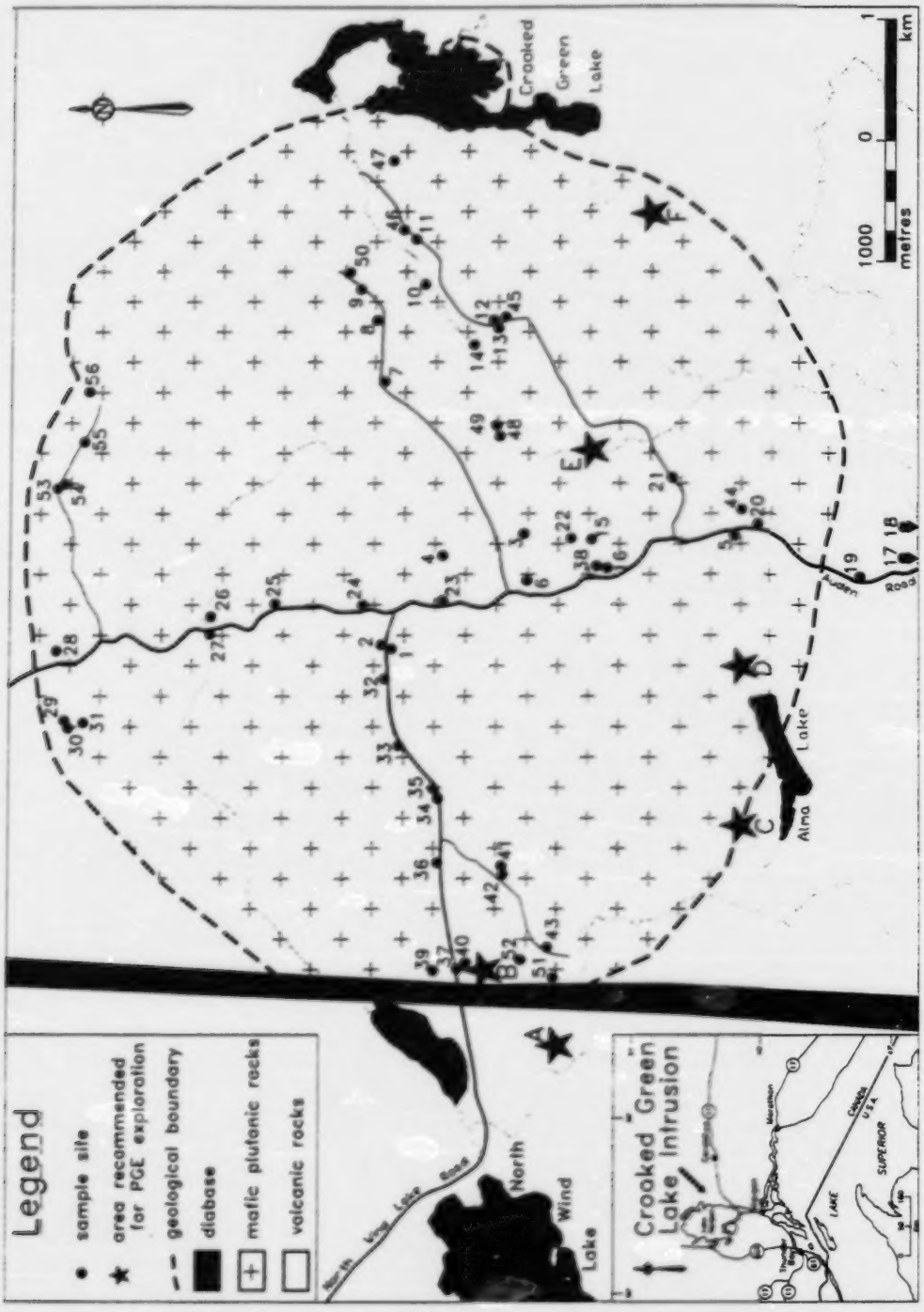

Figure 8. Crooked Green Lake Intrusion (modified after Amukun 1980a).

A low-lying outcrop of vari-textured or pegmatitic gabbro was observed in the south ditch of the "new" North Wind Lake Road approximately 1.7 km east of the North Wind Lake boat launch area. PGE were not detected in a sample taken from this location; nonetheless, further exploration efforts should be expended to ascertain the extent of this lithology. In order to compare the geochronology of the Crooked Green Lake and Lac des Iles intrusions, G.M. Stott sampled the Crooked Green Lake intrusion. He was unable to get an age from the Crooked Green Lake intrusion as a north margin sample returned an older age indicative of inherited zircons (G.M. Stott, OGS, personal communication, 2001). Due to zircon abundance in pegmatitic gabbros, it is planned to resample the previously mentioned site for an age determination.

There has been a distinct lack of mineral exploration in this area. R. Michon completed a reconnaissance prospecting program (OP95-170) in 1995 for gold and base metals over the northwest portion of the Crooked Green Lake intrusion. He was unsuccessful in identifying areas that would warrant further exploration efforts. L. Holt, M. Holt and M. Nelson completed a prospecting, stripping, sampling and ground geophysical program for Cu, Ni and PGE over their property in the east central portion of the intrusion in 1999. They did not discover any anomalous PGE mineralization, but they did receive some encouragement from a grab sample (~1 km east of the northeast shore of Crooked Green Lake) from the "q,cp,py" occurrence noted on Map 2429 (Amukun 1980b) that returned "4440 ppm copper" (Assessment Files, Thunder Bay North District, Thunder Bay). Also, large sulphide rich boulders were discovered just east of the beaver dam on the south road that returned some anomalous copper (L. Holt, prospector, personal communication, 2001). As these boulders were angular, it is believed that their source is local.

Castlewood Lake Intrusion

The Castlewood Lake intrusion is located 1 km northwest of Castlewood Lake. It is accessible by road as the Castlewood Lake Road cuts through the southwest edge of the intrusion. According to G.M. Stott (personal communication, 2001), this intrusion is a sanukitoid in that he noted several distinct phases (i.e. tonalite, granodiorite and quartz gabbro lithologies). The magnetic features depicted on maps 81299 (OGS 1989) and 2136 (ODM-GSC 1962a) support this observation. These intrusions form good hosts for PGE mineralization (Stern et al. 1989). High magnesian magmas (i.e. higher temperature magmas that are more likely to have greater sulphur saturation) have good potential for PGE mineralization (Stern et al. 1989). Amukun (1980a) reported that sample no. 83 (collected ~3.4 km north of the west end of Castlewood Lake) analyzed 11.8% MgO; consequently, the east-central portion of the Castlewood Lake intrusion is elevated in magnesium content. The high magnesium and magnetic character of this sanukitoid intrusion suggest that it is a prospective target for PGE mineralization.

Previous work by Northgate Exploration Ltd., who explored for base metals south of the intrusion in 1985, resulted in a 640 ppm Cu analysis from a soil sample located in the south central portion of the intrusion. As well, P. Lassila completed prospecting, geology and ground geophysical surveys on the AEM Anomaly property over the southeast portion of the intrusion in 1994. He was unable to ascertain the cause of the strong, single flight line conductor (Assessment Files, Thunder Bay North District, Thunder Bay).

Onaman River Confluence Intrusion

The Onaman River Confluence intrusion is located 1 km west of Conglomerate Lake near the junction of the North and South Onaman rivers. This elliptical gabbroic intrusion measures ~3 km north-south by 5 km east-west. One of the seven grab samples collected in this area was taken from a diabase dyke outcrop on the south bank of the North Onaman River. Sample no. 60 analyzed 11.1% MgO (Amukun 1980a); consequently, the west-central portion of the Onaman River Confluence intrusion may be elevated in magnesium content. As stated previously, high magnesian magmas (i.e. higher temperature magmas that are more likely to have greater sulphur saturation) have good potential for PGE mineralization.

Previous exploration efforts by Kerr Addison in 1983 resulted in a 150 ppm Cu and 150 ppm gold soil anomaly in the west central portion of the intrusion (Assessment Files, Thunder Bay North District, Thunder Bay). R. Salo and E. Korba staked a 16-unit claim in the center of this intrusion in August 2000.

Gzowski Lake Area

G.M. Stott (OGS, personal communication, 2000) recommended sampling for copper, nickel and PGE mineralization in the Gzowski Lake area. The southern margin of the Deeds Lake pluton and the gabbro sill that outcrops between the Deeds Lake and Gzowski Lake plutons should be investigated. These two lithological units are depicted by intermittent magnetic highs on maps 2138 (ODM-GSC 1962b), 2145 (ODM-GSC 1962c) and 81284 (OGS 1989). Three samples were collected from the mafic phase at the southern margin of the Deeds Lake pluton. No appreciable PGE enrichment was detected. Systematic sampling across this 500 m wide and 9 km long gabbroic phase of the pluton is warranted . As well, the glomeroporphyritic gabbro (Stott et al. 1998) that outcrops 350 m north of the northernmost portion of Gzowski Lake should be investigated for PGE mineralization.

Rare Metal Pegmatites

Recent dramatic increases in the price of tantalum have been the result of higher demand for tantalum-based products, such as capacitors in the electronics industry. These higher prices (Avalon Ventures Ltd., Press Release, December 11, 2000) have prompted interest in the local exploration community.

Tantalum is found mainly in the minerals tantalite [$(Fe,Mn)Ta_2O_6$] (analogous with its solid-solution counterpart, columbite [$(Fe,Mn,Mg)Nb_2O_6$]) and euxenite $(Y,Ca,Ce,U,Th)(Nb,Ta,Ti)_2O_6$. Tantalum also occurs in the mineral pyrochlore [$(Na,Ca)_2Nb_2O_6(OH,F)$] and in a similar mineral, microlite [$(Ca,Na)_2Ta_2O_6(O,OH,F)$]. It is also found as a trace element in rutile (TiO_2). Economic concentrations of tantalum and niobium are typically associated with carbonatite-alkalic complexes, pegmatites and S-type granitoids in association with other rare metals (e.g. lithium, cesium, rubidium, beryllium, zirconium, etc.), uranium, thorium and rare earth elements. Tantalum is also a byproduct from the extraction of tin.

Tantalum is mentioned in compilations of niobium (a.k.a. columbium) and pegmatite deposits in Ontario, prepared by Ferguson (1971) and Hewitt (1967), respectively.

There are several locations that are prospective for tantalum mineralization within the Thunder Bay North district. Mineral exploration is recommended near known lithium-bearing pegmatites (e.g. Lilypad Lake, Linklater Lake, Zigzag Lake and Georgia Lake areas). As well, recent Operation Treasure Hunt

lake sediment surveys outline prospective areas for tantalum exploration (see Recommendations for Exploration section).

LILYPAD LAKES AREA

The following has been modified after "http://www.avalonventures.com/lilypad.htm":

The Lilypad Lakes tantalum-cesium project consists of 14 claims covering a field of rare metals pegmatites, located 150 km northeast of Pickle Lake, Ontario. Avalon Ventures Ltd. staked the claims in January 1999. The area was previously explored for lithium in the 1950s by Standard Lithium Corporation ("Standard") and for tantalum in 1979-81 by Tantalum Mining Corporation of Canada ("Tanco"). Only partial records of this exploration work are available in the assessment files. Standard drilled at least 12 holes totaling 968 m in two targets, but did not assay for tantalum or cesium. Tanco carried out geophysical (max/min and magnetometer) surveys and lithogeochemical sampling resulting in the identification of 10 tantalum targets. These were tested with at least 43 shallow holes totaling over 4000 m of which 21 holes were drilled on just two of the targets. Assay data are only available from two holes which tested a target called the South Dyke, intersecting significant tantalum values of 0.058% Ta_2O_5 across 9.75 m and 0.038% Ta_2O_5 across 10.97 m, respectively. Tanco did not assay for cesium, rubidium or lithium.

An initial reconnaissance mapping and sampling program carried out in 1999 by Avalon Ventures Ltd. confirmed the presence of economically-significant tantalum mineralization at several locations on the property and resulted in the discovery of high-grade cesium mineralization in association with the tantalum. Select grab samples from the Rubellite Dyke produced tantalum values of up to 0.113% Ta_2O_5 and one 12 m wide section of the Pollucite Dyke averaged 0.04% Ta_2O_5 across its full width, accompanied by 2.45% Cs_2O (cesium oxide).

Preliminary mineralogical studies have confirmed that the tantalum at Lilypad Lakes occurs predominantly in microlite, a tantalum-rich mineral which typically contains 70-80% Ta_2O_5. Its grain size ranges from 50 to 500 microns (which will make it free-milling), and it lacks complex intergrowths with other minerals. The cesium occurs in the rare cesium ore mineral pollucite, which is presently being mined by Tanco at Bernic Lake, Manitoba, to produce a new specialty drilling fluid, called cesium formate, for deep oil wells.

A $560,000 integrated exploration program involving grid construction, gravity surveys, mineralogical tests, detailed geological and geochemical surveys and diamond drilling was completed from September to December 2000.

An 8-hole, 1094 m diamond drilling program was completed in December 2000. Economically-significant tantalum mineralization ranging in grade from 0.023% to 0.158% Ta_2O_5 over estimated true widths of 0.5 to 28.0 m was intersected in all eight holes, and all three of the targets tested show excellent vertical continuity.

The most encouraging results have been received from the Rubellite Dyke where six of the eight holes were drilled on four sections spaced 20 to 25 m apart to a maximum vertical depth of 130 m. The deepest intersection produced the greatest thickness averaging 0.026% Ta_2O_5 across an estimated true width of 28.0 m. Results from the six holes drilled on the Rubellite Dyke indicate very good continuity of economic-grade tantalum mineralization over a minimum strike length of 70 m and to depths exceeding 130 m where the pegmatite appears to widen. The mineralization is also remarkable in its consistency of grade from wall to wall in the pegmatite. A follow-up $1.0 million exploration program is currently

being planned. This program will include additional gravity and magnetometer surveys and diamond drilling to further delineate the size and grade of the Rubellite Dyke and test other tantalum and cesium targets on the property.

LINKLATER LAKE AREA

Since their discovery by Stanley Johnson in 1943, tin and beryllium occurrences have been documented at the eastern end of Linklater Lake, located north of Lake Nipigon. San Antonio Gold Mines conducted an exploration program over this area in 1948. Sampling from eight short drill holes totaling 735 feet, and 18 trenches "disclosed cassiterite mineralization in narrow discontinuous felsite dikes in a zone 1500 feet long by 50 feet wide" (Assessment Files, Thunder Bay North District, Thunder Bay). It was concluded that the tin occurrence was not economic and the property was abandoned.

Chimo Gold Mines Limited examined the Linklater Lake tin occurrence in 1960. Six holes totaling 556 feet encountered narrow (1 inch to 9 inch wide) pegmatite dikes with "heavy cassiterite mineralization" (Assessment Files, Thunder Bay North District, Thunder Bay). The property was once again allowed to lapse.

G. O'Reilly staked 3 claims over the Linklater Lake Tin Occurrence in June 1999 on the basis that tantalum is associated with cassiterite mineralization (Resident Geologist's Files, Thunder Bay North District, Thunder Bay). This association was confirmed by the results of A. Tindle who demonstrated the presence of Ta_2O_5 in amounts ranging from 0.34 to 0.99% within cassiterite (Assessment Files, Thunder Bay North District, Thunder Bay). This may be inconsequential as previous sample results for the occurrence were up to 2.60% tin (Thurston and Carter 1970).

The Linklater Lake area is underlain from south to north by Archean mafic metavolcanic rocks, quartzite and muscovite-bearing granites. The lake itself occupies a prominent lineament suggestive of a large fault zone; accordingly, this is a very prospective area for tantalum bearing pegmatites. As, "Rock exposures are plentiful, and overburden relatively light..." (Assessment Files, Thunder Bay North District, Thunder Bay) surface stripping should be a highly effective exploration tool in the Linklater Lake area. As tantalum is often associated with niobium, the niobium anomalies depicted at Linklater Lake suggest that further exploration efforts are warranted. Nonetheless, "Significant noise in the QC standards for the elements Cd, Nb, Sn and Sb indicate that these elements should be interpreted with caution..." (OGS 2000a).

ZIGZAG LAKE AREA

Frank Tebishogeshik discovered several spodumene-bearing pegmatites (that were to become known as the Zigzag Lake lithium prospect) just northwest of Tettares Lake (north of Lake Nipigon) in June 1956. Dempster Explorations Limited optioned the property later that summer; preliminary work consisted of stripping and trenching of known pegmatite dikes. In May 1958, the company contracted R.G. Hoiles to complete geological mapping of their West Group at a scale of 1 inch to 400 feet. Dr. Hoiles also completed 1 inch to 40 feet geological mapping over the Main Showing within the West Group. He recommended bulk sampling, diamond drilling, beryl content evaluation, and study of lithium extraction methodology. There is no record of this follow up work and the property was abandoned. (Assessment Files, Thunder Bay North District, Thunder Bay).

Bird River Mines acquired the Zigzag Lake lithium prospect in 1975, and they completed ground magnetic and preliminary geochemical surveys over claims TB417358 to 61 inclusive in July 1975. The highest analysis returned 520 ppm Li_2O over 25 feet just northwest of Tettares Lake. From 1979 to 1984, the company completed geological and geochemical surveys for lithium, tantalum, gallium, molybdenum,

beryllium, vanadium, rubidium and cesium on their property. Although encouraged by their results, world market conditions dictated that the prospect was sub-economic and the property was once again allowed to lapse. (Assessment Files, Thunder Bay North District, Thunder Bay).

In 1979, Cominco Ltd. completed magnetometer, geological and geochemical surveys over their joint venture property with E.B. Explorations Inc. This property was located immediately to the west of Bird River Mines' Zigzag Lake lithium prospect. Their best results from the IFB showing were 0.77% Li_2O, 150 ppm Ta and 410 ppm Cs. The claims were allowed to lapse in August 1981. (Assessment Files, Thunder Bay North District, Thunder Bay).

The Zigzag Lake lithium prospect was staked by N. Cox in March 1996. He optioned the property to Complex Minerals Corp. who conducted a preliminary exploration program consisting of mechanical stripping, ground magnetic, electromagnetic, and reconnaissance geological surveys in the summer of 1997 (Assessment Files, Thunder Bay North District, Thunder Bay). An extensive stripping and sampling program was recommended, but the claim was cancelled on March 21, 2000.

Amidst recent increases in the price of tantalum, T. Maitland staked a 6 unit claim over the Zigzag Lake prospect in March 2000. The property has been optioned by Murgor Resources Inc. (Murgor Resources Inc., press release, January 24, 2001) who have staked an additional 40 units to acquire the Chappais Lake lithium occurrence. Further staking has also been undertaken to include the Despard, Falcon Lake and East Dempster lithium occurrences. An exploration program for tantalum-bearing pegmatites is planned for 2001 (G. Clark, Clark Exploration Consulting, personal communication, 2001).

SEYMOUR LAKE AREA

Three lithium occurrences have been explored since 1957 in the Seymour Lake area, north of lake Nipigon: North Aubry, South Aubry and Seymour Lake. The North and South Aubry occurrences were investigated by detailed geological mapping, sampling, and diamond drilling by the Anaconda Company (Canada) Limited. The North Aubry pegmatite body intrudes mafic volcanic rocks; it strikes northerly and is exposed for ~200 m with a true thickness of ~4.5 m. It is comprised of microcline, albite, spodumene, quartz, muscovite, apatite and beryl. The average spodumene content of this pegmatite is 30% which equates to 1.5% Li_2O. The South Aubry deposit strikes northwesterly and is exposed for ~120 m with a true thickness of greater than 15 m. The Seymour Lake occurrence is a north-trending pegmatite dyke consisting of feldspar, quartz, muscovite, apatite, garnet and spodumene (Pye 1968).

The Seymour Lake tantalum, lithium and beryllium property was staked by M. Stares and S. Stares (Stares Contracting Corporation) in December 2000. This 16-unit claim has been optioned by Linear Resources Inc. (Linear Resources Inc., press release, January 18, 2001); further staking has taken place in January 2001 surrounding this claim.

GEORGIA LAKE-COSGRAVE LAKE AREA

"One of the outstanding features of the Georgia Lake area is the great abundance of pegmatites close to and within the large masses of granitic rocks, ..." The pegmatites occur in two ways: as irregular-shaped bodies; and as thin dykes, sills and attenuated lenses (Pye 1965).

Zayachkivsky (1985) discovered that tantalite-columbite minerals (TCM) were more extensively distributed in the Georgia Lake pegmatite field (Pye 1965) than had previously been reported. Although traces of TCM are dispersed with interstitial minerals (e.g. Brink occurrence, Southwest pegmatites) and spodumene-quartz intergrowth (e.g. MNW), most are associated with secondary albitization. At the MNW pegmatite, where TCM may reach economic concentrations, they occur as inclusions in tin oxide minerals and as separate, tabular crystals along the albitization front marked by fans of albite (Zayachkivsky 1985).

As shown in the following table, there is a significant difference in the characteristics of the three pegmatite groups in the Georgia Lake area (Pye 1965):

Cosgrave Lake Pegmatite Group	Georgia Lake Pegmatite Group	Lake Jean Pegmatite Group
Highly metamorphosed	Moderately metamorphosed	Weakly metamorphosed
Non-porphyritic	Porphyritic	Very porphyritic
Unzoned	Some zonation	Crude zonation
No quartz veins	No quartz veins	Abundant quartz veins
Abundant tourmaline	Some tourmaline	Rare tourmaline
No aplite dykes	Some aplite dykes	Abundant aplite dykes
Some beryl	Rare beryl	Rare beryl
Some columbite	Some columbite	Rare columbite

This comparison of the three pegmatite groups may assist explorationists in narrowing their focus on one particular area within the Georgia Lake-Cosgrave Lake area. At first glance, the characteristics of the Cosgrave Lake pegmatite group appear to be the most prospective for tantalum mineralization, but this may only be inherent to the extent of past exploration efforts.

Although there has been recent claim staking west of Cosgrave Lake and southwest of Georgia Lake, large areas with prospective tantalum-bearing pegmatites remain unstaked south of Palace Lake, east of Georgia Lake and all of Barbara Lake.

RECOMMENDATIONS FOR EXPLORATION

Operation Treasure Hunt - Lake Sediment Surveys

Two lake sediment survey projects by the Ontario government were conducted in the Thunder Bay North District under the three-year, $29 million Operation Treasure Hunt program in September and October 1999. The results, in the form of two open file reports, were released for the Armstrong-Lake Nipigon area (OGS 2000a: OFR 6027) and the Nakina-Longlac area (OGS 2000b: OFR 6035) in 2000. These areas were not covered by the 1980s National Geochemical Reconnaissance (NGR) joint government lake sediment program or any previous Ontario Geological Survey study. In excess of 2000 sediment samples were collected from each project site and analyzed for over 50 elements. This resulted in the discovery of more than 30 anomalous areas or locations at each project and new targets for PGE, gold and base metal mineralization. The method involved organic lake sediment samples collected from a helicopter float using a gravity corer. Only deep sediment (>20 cm below the sediment surface) was collected, which better reflects the effects of natural geochemical inputs that may be traced to local geology. A GPS receiver was utilized to record accurate sample site locations (OGS 2000b).

The Armstrong-Lake Nipigon Lake sediment survey identified several areas of anomalous base metal and PGE mineralization. Two highly perspective, multi-element, multi-site PGE target areas are located over rocks of the Nipigon diabase along the northwest and northeast shore of Lake Nipigon. These include the North Wabinosh Bay-Walkover Lake area and the North Peninsula region (Western Ombabika Bay) respectively. However, at present (December 2000), both target areas have been removed from staking as part of a proposed Lake Nipigon Conservation Reserve under the Ontario Living Legacy program. Six additional target sites that should be explored are listed and discussed below:

1. East Caribou-Linklater-Ratte lakes area: Anomalous amounts of Cu, Ni, Cr, Pd, Pt, Ag, Zn, As and Co were detected. Rare earth elements were also identified in the Ratte Lake area. This region is underlain by mafic-ultramafic metavolcanics and intrusives, Nipigon diabase and gneissic rocks.

2. Falcon Lake area: The region contains numerous sample sites with anomalous Ni-Cr along the contact zone underlain by Nipigon diabase and metavolcanic rocks. It is important to note that roads now access this general area from the Town of Armstrong, as a result of recent logging activities.

3. Holland-Whiddon lakes area: Anomalous Cu, Mo, Pd, As, Ag and rare earth elements were identified over four samples sites in this area, which is underlain by gneissic rocks.

4. Gort-Toset lakes area: Analyses depicted on p.60-62 in OGS 2000a illustrate a potential PGE association with the diabase sill that stretches from Gort Lake to Toset Lake.

5. Gull Bay-Obonga Lake area: Strong unexplained vanadium anomalies north of Gull Bay (staked in 2000 as a result of the survey release) and north of the east end of Obonga Lake (unstaked as of January 2001). These areas are coincident with anomalous Pt, Pd, Cu, Ni, Au and Ag results.

6. Klotz Lake area: Strong zinc anomaly depicted at the northwest end of Klotz Lake on p.73 of OGS 2000b is coincident with a northwest trend of magnetic highs on map 81316 (OGS 1989). As this area is underlain by metavolcanic rocks (ODM 1969), it is prospective for VMS style base metal mineralization.

Since "The precision of FA/ICP-MS elements (Au, Pt and Pd) was excellent" (p.7 of OGS 2000b and p.9 of OGS 2000a), follow up is warranted for all high percentage gold anomalies. The anomaly (p.50 of 2000a) southwest of Mojikit Lake may be a target for exploration as unmapped greenstone terrane has been outlined in the area. The strong north-south trend of anomalies in southwest Bain Township (p.48 and p.51 of OGS 2000b) should be investigated. As this area has been withdrawn for an Ontario Living Legacy site, exhaustive exploration is not advised. The moderate anomalies in northwest Oakes Township, west-central Houck Township, southwest McQuesten Township and northeast of Pagwachuan Lake also warrant reconnaissance prospecting for gold mineralization.

All clusters of niobium anomalies depicted on p.40 and p.58 of OGS 2000a, and p.81-83 of OGS 2000b warrant further investigation for tantalum mineralization. Nonetheless, "Significant noise in the QC standards for the elements Cd, Nb, Sn and Sb indicate that these elements should be interpreted with caution" (OGS 2000a, p.9 and OGS 2000b, p.7). An 80 km trend of moderate niobium anomalies extends from Campbell Lake to Falcon Lake; in light of the number of lithium occurrences along this trend, this area merits reconnaissance prospecting for potential tantalum-bearing pegmatites.

Geochemical survey results should be interpreted using a topographic map as drainage patterns are critical. Small lakes with single inlets are most likely proximal to the bedrock source of the lake bottom sediment sample. Individual sample sites are clearly depicted on the back pocket maps at a scale of 1:100 000. Detail or compilation geology maps will be constructive in determining whether prospective bedrock is in the vicinity of the anomalies. As well, previously published government geophysical maps (1989 or 1962) will be invaluable in determining extent of mafic plutonic rocks (especially those previously unmapped) prospective for PGE mineralization.

There are several methods by which an explorationist can utilize the geochemical data contained in OFR 6027 and OFR 6035. The page sized anomaly maps near the front of the reports can be used with current claim, geological and geophysical maps to outline areas requiring reconnaissance prospecting. A caution should be presented as these maps do not summarize all of the prospective areas within these surveys. For example, there is a strong zinc anomaly depicted at the west end of Klotz Lake on p.73 of OGS 2000b, but there is no corresponding anomaly ellipse depicted on p.20. It is therefore recommended that explorationists carefully review the proportional dot maps in Appendix B of the open file reports for their commodity of interest. Although exhausting, review of the analytical data tables in Appendix C of these reports may also glean prospective targets. As these reports were released as miscellaneous releases of data, those GIS-oriented explorationists may be able to use the digital information to generate some new exploration targets.

Airborne geophysical maps, including both the more recent 1988 Ontario government Aerodat survey (covering the Falcon Lake area) and the 1962 joint Ontario-federal government magnetometer survey series, should be utilized in conjunction with the geochemical data and bedrock geology.

A discussion of key results from Operation Treasure Hunt's Nakina-Longlac Lake sediment survey is included in the section on the "Wabigoon-Quetico Subprovince Boundary".

Operation Treasure Hunt – Airborne Geophysical Surveys

Two Operation Treasure Hunt airborne geophysical (maps 82145-82149 for Vickers area (OGS 2000d) and 82096-82123 for Garden-Obonga area (OGS 2000c)) surveys that pertain to Thunder Bay North District were released in 2000. Explorationists have already utilized these surveys; Inco Limited, Noranda Inc. and Pierre Gagne staked large claim blocks over the Vickers area in anticipation of the Operation Treasure Hunt data release on July 20, 2000. As well, numerous claims have been staked and exploration programs have been initiated over the Garden-Obonga area during the fall of 2000.

The Vickers area magnetic data clearly outlines three areas with discrete magnetic characteristics to the mafic intrusion centred on Otoskwin Lake; these areas are currently unstaked. This magnetic expression may indicate that this is a sanukitoid intrusion that is prospective for PGE mineralization. As this area is in close proximity to the boundary of the Windigo Tribal Council Planning Board, notification of mineral exploration activities would be required. Coincident magnetic and electromagnetic anomalies southeast of Semia Lake on map 82149 (OGS 2000d) illustrate the potential for iron formation hosted gold mineralization in this area. The intensely folded iron formation illustrated in the Vickers area survey just northwest of Lang Lake should also be investigated for gold mineralization. These recommendations are supported by preliminary geological maps P.581, P.665, and P.738 (Fenwick 1970, 1971 and 1972 respectively).

Tantalum

There are several locations that are prospective for tantalum mineralization within the Thunder Bay North district. Mineral exploration is recommended near known lithium-bearing pegmatites (e.g. Lilypad Lake, Linklater Lake, Zigzag Lake and Georgia Lake areas). In particular, the boundary zone between Campbell Lake and Falcon Lake warrants reconnaissance prospecting for potential tantalum-bearing pegmatites. This 80 km portion of the Wabigoon and English River Subprovince boundary (Figure 9) is host to at least seven lithium occurrences (Pye et al. 1966). Furthermore, north trending structures off of this zone host at least ten lithium occurrences. The English River and Uchi Subprovince boundary from Otatakan Lake to Greenbush Lake is also prospective for tantalum-bearing pegmatites as map 2442 (Breaks et al. 1979) illustrates at least 18 tourmaline ± lithium occurrences in this 135 km trend. Although there has been recent claim staking west of Cosgrave Lake and southwest of Georgia Lake, large areas with prospective tantalum-bearing pegmatites remain unstaked south of Palace Lake, east of Georgia Lake and all of Barbara Lake. All 33 lithium-bearing pegmatite deposits in the Thunder Bay District that are listed in Table 21 of Hewitt (1967) should be investigated for their tantalum, cesium and rubidium potential. As well, the four lithium-columbium occurrences listed on p.53 of Ferguson (1971) in the Georgia Lake area should be investigated for their tantalum, cesium and rubidium potential.

Platinum Group Elements

During the past two years there has been a marked increase in exploration for the platinum-group elements (PGE) in Northwestern Ontario. This renewed interest has been influenced by a number of political and industrial factors such as increased demand, largely from the automotive industry (in catalytic converters that use platinum or palladium as a catalyst), and curtailed metal shipments from Russia. The result has been a dramatic rise in the prices of platinum and palladium (unpublished booklet, Resident Geologist's Files, Thunder Bay North District, Thunder Bay).

When searching for PGE deposits of Cu-Ni sulphide association, the most important controlling factor is the presence of sulphides, ideally in low percentages. However, the safest course would be to sample any sulphides observed in mafic or ultramafic intrusive rocks, especially if they are related to brecciated zones, pegmatites, or shear zones. Dimethylglyoxime powder, or "nickel test", when mixed with water and applied on a nickel-bearing sample's surface, will form a bright pink to red precipitate. Because of the association between nickel and PGE, this quick and easy test can also help to identify prospective PGE-bearing rocks (unpublished booklet, Resident Geologist's Files, Thunder Bay North District, Thunder Bay).

There are at least seven areas that warrant further exploration for PGE mineralization in the Crooked Green Lake intrusion. Five of these areas are unstaked as of January 2001.

The high magnesium and magnetic character of the Castlewood Lake and Onaman River Confluence intrusions suggest that they are prospective targets for PGE mineralization. As well, PGE mineral exploration is warranted in the Gzowski Lake area gabbro sills and the mafic phase of the Deeds Lake pluton.

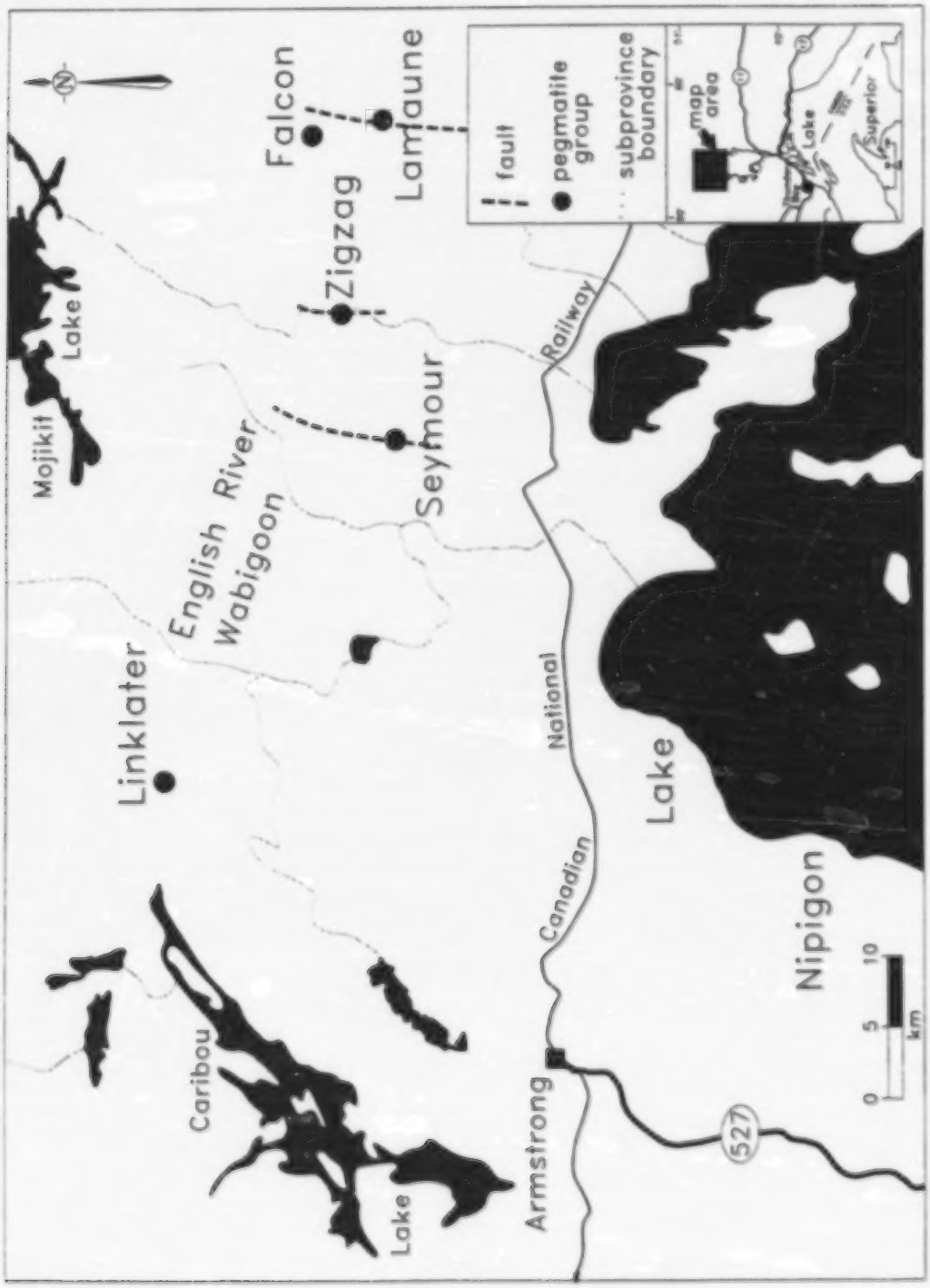

Figure 9. Linklater-Falcon Lakes Area

WABIGOON-QUETICO SUBPROVINCE BOUNDARY

The Wabigoon Subprovince-Quetico Subprovince boundary east of Longlac has seen minimal exploration activity related to PGE mineralization. The lack of any detailed geological mapping, in particular where rocks of the Wabigoon Subprovince are overlain by Paleozoic cover of the Hudson Bay Lowlands northeast of Caramat, further enhances the potential of this region. Discovery of the PGE-bearing mafic intrusive bodies along the northern boundary of the Quetico Subprovince both in the Atikokan-Shebandowan area to the west and more recently, in the Hearst area to the east, increases the mineral potential of the entire subprovince boundary zone east of Lake Nipigon. Work by East West Resource Corporation and Canadian Golden Dragon Resources Ltd. (1999-2000) on their McCoig-Fintry-Shuel township properties, 80 km west of Hearst, has identified several pyroxenite-gabbro bodies containing anomalous PGE mineralization.

There are several sources of information, both past and recent, that can be used to locate magnetic anomalies, which may be related to mafic intrusive bodies in this area. The 1962 joint federal-provincial government regional airborne magnetometer survey maps (scale 1:63 360) and the 1:1 000 000 scale Geology of Ontario (1991) maps, in particular the total magnetic field (Map 2586, OGS 1991) and vertical magnetic gradient (Map 2590, OGS 1991) series, are highly useful in delineating anomalous magnetic features. The recent release (December 2000) of Operation Treasure Hunt Nakina-Longlac Area Lake Sediment Survey (OGS 2000b) contains information that should be utilized in conjunction with the geophysical data (1989 or 1962) for the eastern Longlac region. Several anomalous areas related to Cu-Ni-PGE mineralization have been identified by the survey and should be explored. These are listed in order of importance as follows:

1. East Chipman Lake-Fernow Lake area (O'Meara-Fernow townships).
2. Sadie-Meg-McKay lakes area (south-southeast of Longlac).
3. Caramat-Mustela Creek area (Caramat area).
4. East Lukinto-Sandlink lakes area (east of Longlac).

It is significant to note that all four of these areas display multi-site, multi-element anomalies, i.e. PGE with accompanying base metal signatures. The drainage systems within each of these areas should be studied carefully with special attention to in-flow points, basin influence and any known local bedrock geology.

OGS ACTIVITES AND RESEARCH BY OTHERS

J.C. DeWolfe, B. Lafrance and G.M. Stott initiated a structural investigation of mesothermal gold mineralization in the Beardmore-Geraldton terrane.

K.H. Straub completed a VMS geochemical study of hydrothermal alteration relative to base metal mineralization in the Marshall Lake area, northern margin of the Onaman-Tashota greenstone belt.

F. Santaguida continued with the bedrock map compilation project, northwestern Ontario, Operation Treasure Hunt.

J.A. Percival and M.D. Young initiated a lithotectonic study in the Pickle Lake greenstone belt. The study is a portion of the NATMAP Western Superior Crustal Evolution study.

G.M. Stott and D. Davis released further geochronological data for the Onaman-Tashota greenstone belt, assisting in further subdivision of tectonostratigraphic assemblages.

The Operation Treasure Hunt lake sediment and water geochemical program released the Nakina and Armstrong-Lake Nipigon studies in 2000. The Fort Hope area will be released in 2001.

The Operation Treasure Hunt airborne magnetometer and frequency domain survey for the Vickers area was released in 2000. Fugro Airborne Surveys conducted the work with a Dighem V airborne EM system and cesium-vapour magnetometer. The Garden-Obonga area airborne geophysical survey was released in 2000.

K.Y. Tomlinson completed a neodymium isotopic data study from the central Wabigoon Subprovince: implications for crustal recycling in 3.1 to 2.7 Ga sequences (Tomlinson 2000).

K.Y. Tomlinson and J.A. Percival completed a geochemistry and Nd isotopic study of granitoid rocks in the Shikag-Garden Lakes area: recycled Mesoarchean crust in the central Wabigoon Subprovince (Tomlinson and Percival 2000).

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J. Mason edited the manuscript. Prospectors and company personnel are thanked for their contributions.

Table 5. Mineral deposits not being mined in the Thunder Bay North District in 2000.

Abbreviations

AF.....Assessment Files
CMH.....Canadian Mines Handbook
GR.....Geological Report
MDC.....Mineral Deposit Circular
MDIR.....Mineral Deposit Inventory record
MLS.....Mining Lands, Sudbury
MR.....Mining Recorder
NM.....The Northern Miner
OFR.....Open File Report
PC.....Personal Communication

Deposit Name/ NTS	Commodity	Tonnage-Grade Estimates and/or Dimensions	Ownership References	Reserve References	Status
Arseno Lake (53B14/NE)	Zn, Pb, Cu, Ag	1 MT @ 8.7% comb. Zn-Pb, 1.5 opt Ag	Energold Minerals Inc./Northern Dynasty Minerals Ltd.	1988 Annual Report Northern Dynasty Explorations Ltd.	Inactive
Big Trout Lake (53H12/SW)	Pt, Pd, Cr	Not available	Platinex Inc.	AF	Active
Brookbank (42E12/NW)	Au	1.3 Mt @ 0.26 opt Au	Ontex Resources Ltd.	CMH 1995-96, p.245	Reserves defined by diamond drilling 1983-88. Gold zones diamond drilled 2000.
Dobie Zone (52O06/NE)	Au	301 000 t @ 5.5 g/t Au	Major General Resources Ltd.	MDIR KP1082	Inactive
Goss Lake (52P09/SW)	Au	300 000 T @ 0.23 opt Au to 60 m depth	Ayrex Resources Ltd./Tandem Resources Ltd.	CMH 1995-96, p.50	Last active 1988.
Headway Coulee (42L04/SE)	Zn, Ag	250 000 T @ 4.44% Zn, 1.32 opt Ag	N. Cox, M. Holt	OFR 5630, p.41	Diamond drilling and stripping – Big Mac zone 1995. Geophysics 1997.
Howells Lake (52P10/SW)	Au	83 000 T @ 0.07 opt Au (+1.37% antimony) and 660 000 T (+3.1% antimony) with erratic Au values	Homestake Canada Inc.	OFR 5926, p.68	Last active in 1988.
Jacobus (42E13/SE)	Cu, Ni	1 MT @ 0.94% Cu-Ni	NWT Copper Mines Limited	CMH 1995-96, p.275	Most recent work diamond drilling by SEG in 1993. Deposit open down plunge.
Juneau Lake (42L05/SW)	Ni, Cu, PGE	2.2 MT @ 0.87% Ni, 0.59% Cu	Landore Resources Inc.-Brancote	OFR 5630, p.41	Stripping, sampling, prospecting 2000.
Karl-Zeemel (53B09/SW)	Au	327 000 t @ 4.6 g/t Au	Pangea Goldfields Inc./Placer Dome North America Ltd.	NM Jan. 8, 1996, p.15	Active
Kasagiminnis Lake (52O08/SW)	Au	284 000 t @ 5.8 g/t Au	Greenshields Resources Inc.	MDIR KP1129	Inactive
Koval-Ohman (52O07/SE)	Au	471 589 t @ 5.81 g/t Au	Barrick Gold Corp.	MDIR KP0243	Inactive

Deposit Name/ NTS	Commodity	Tonnage-Grade Estimates and/or Dimensions	Ownership References	Reserve References	Status
Lavoie Lake (43D05/NE)	Cu, Ni	14.6 MT @ 0.58% Cu, 0.37% Ni	PGM Ventures Inc.	OFR 5926, p.101	Last active 1992. Compilation 1995. Recent acquisition.
Lynx Canada (42L04/SE)	Cu, Ag	25 000 T @ 4.0% Cu, 300 000 T @ 2.0% Cu, 1.0 opt Ag	N. Cox, M. Holt	OFR 5630, p.41	Diamond drilling and stripping – Big Mac zone 1995.
Magnet Consolidated Mine (42E11/NE)	Au	150 700 T @ 0.38 opt Au, 1 082 340 T @ 0.34 opt Au	Roxmark Mines Limited/Beaurox Mines	CMH 1995-96, p.330	U/G development in 1982-87.
Marshall Lake (42L05/NE)	Cu, Zn, Ag, Au	1.22 MT @ 3.2% Zn, 0.94% Cu, 2.2 opt Ag	Giant Gripp Mines	CMH 1995-96, p.275	Diamond drilling 1996-97.
Norton Lake (42M14/NW)	Ni, Cu	1.0 MT @ 0.72% Ni, 0.56% Cu	Open	OFR 5926, p.136	Last active 1987.
Paulpic (42L04/NE)	Au	200 000 T @ 0.231 opt Au	Canada Tungsten Inc.	OFR 5630, p.465	Last active 1987.
Pickle Crow Gold Mine (52O09/SE)	Au	1 395 700 t @ 0.186 opt Au (diluted)	Wolfden Resource Inc./Jompol Explorations Ltd.	MDIR KP0255	9160 t bulk sample #5 vein.
Thierry Mine (52O08/NW)	Cu, Ni	7 MT @ 1.88% Cu, 0.23% Ni	PGM Ventures Inc.	MDIR KP0247	Recent acquisition.
Umex-Dorothy Lake (52O06/NW)	Au	236 220 t @ 6.17 g/t Au	Major General Resources Ltd.	MDIR KP1072	Inactive
Zulapa (42M12/SW)	Au	700 000 T @ 0.28 opt Au to 200 m deep	Eabametoong First Nation	OFR 5926, p.208	

Other abbreviations: g/t, grams per tonne; MT, million tons, opt, ounces per tonne; t, tonne; T, ton.
Notes: OFR 5630 is Mason and White (1986); OFR 5926 is Mason and White (1995).

REFERENCES

Amukun, S.E. 1977. Geology of the Tashota area, District of Thunder Bay; Ontario Geological Survey, Report 176, 90p.

Amukun, S.E. 1980a. Geology of the Conglomerate Lake area, District of Thunder Bay; Ontario Geological Survey, Report 197, 101p.

Amukun, S.E. 1980b. Precambrian geology of the Conglomerate Lake area, District of Thunder Bay; Ontario Geological Survey, Map 2429, scale 1:31 680.

Breaks, F.W., Davies, J.C., Pryslak, A.P. and Pye, E.G. 1979. Sioux Lookout-Armstrong sheet, Thunder Bay and Patricia districts; Ontario Department of Mines, Geological Compilation Series Map 2442, scale 1:253 440.

Cross, D. 1968. Report on an electromagnetic and magnetometer survey, Final Lake property, District of Thunder Bay; Thunder Bay North Resident Geologist's office, 42E14/NW, assessment file, 4p.

Davies, R., Davies, A. and Davies, M. 1993. Report on Altitude Lake, "Gold in Till" sampling program, Jellicoe area, Thunder Bay mining district, Ontario; Thunder Bay North Resident Geologist's office, 42E14/SW, assessment file, 15p.

Fenwick, K.G. 1970. Precambrian geology of Lang-Cannon Lakes (west half); Ontario Department of Mines and Northern Affairs, Preliminary Map P.581, scale 1:31 680.

Fenwick, K.G. 1971. Precambrian geology of Lang-Cannon Lakes (central part); Ontario Department of Mines and Northern Affairs, Preliminary Map P.665, scale 1:31 680.

Fenwick, K.G. and Srivastava, P. 1972. Precambrian geology of Lang-Cannon Lakes (eastern part); Ontario Department of Mines and Northern Affairs, Preliminary Map P.738, scale 1:31 680.

Ferguson, S.A. 1966. Geology of Pickle Crow Gold Mines Limited and Central Patricia Gold Mines Limited, No. 2 operation; Ontario Department of Mines, Miscellaneous Paper 64, 97p.

Ferguson, S.A. 1971. Columbium (Niobium) Deposits of Ontario; Ontario Department of Mines and Northern Affairs, Mineral Resources Circular 14, 58p.

Ferguson, S.A., Groen, H.A. and Haynes, R. 1971. Gold deposits of Ontario, districts of Algoma, Cochrane, Kenora, Rainy River and Thunder Bay; Mineral Resources Circular No. 13, 315p.

Hewitt, D.F. 1967. Pegmatite Mineral Resources of Ontario. Ontario Department of Mines, Industrial Mineral Report 21, 83p.

Hopkins, P.E. 1917. The Kowkash gold area; Ontario Bureau of Mines, v.26, p.190-226.

Hurst, M.E. 1930. Pickle Lake-Crow River area, District of Kenora (Patricia portion); Ontario Department of Mines, v.39, pt.2, 35p.

Innes, D.G. and Ayres, L.R. 1969. Caramat-Pagwa sheet, Thunder Bay and Cochrane districts; Ontario Department of Mines, Geological Compilation Series Map 2202, scale 1:253 440.

Kindle, L.F. 1931. Kowkash-Ogoki gold area, District of Thunder Bay; Ontario Department of Mines, v.40, pt.4, p.55-104.

Kresz, D. 1991. Geology of the Lapierre Lake area, District of Thunder Bay; Ontario Geological Survey, Open File Report 5779, 148p.

Mason, J. and White, G. 1986. Gold occurrences, prospects and deposits of the Beardmore-Geraldton area, districts of Thunder Bay and Cochrane; Ontario Geological Survey, Open File Report 5630, 680p.

Mason, J.K. and White, G.D. 1995. Mineral occurrences and prospects in the Fort Hope-Winisk area; Ontario Geological Survey, Open File Report 5926, 225p.

Ontario Department of Mines–Geological Survey of Canada. 1962a. North Wind Lake sheet, Thunder Bay District, Ontario; Ontario Department of Mines-Geological Survey of Canada, Map 2136G, Airborne Magnetic Survey, scale 1 inch to 1 mile.

Ontario Department of Mines–Geological Survey of Canada. 1962b. Toronto Lake sheet, Thunder Bay District, Ontario; Ontario Department of Mines-Geological Survey of Canada, Map 2138G, Airborne Magnetic Survey, scale 1 inch to 1 mile.

Ontario Department of Mines–Geological Survey of Canada. 1962c. Hanover Lake sheet, Thunder Bay District, Ontario; Ontario Department of Mines-Geological Survey of Canada, Map 2145G, Airborne Magnetic Survey, scale 1 inch to 1 mile.

Ontario Geological Survey. 1989. Airborne electromagnetic and total intensity magnetic survey, Tashota-Geraldton-Longlac area, District of Thunder Bay; Geophysical/Geochemical Series maps 81259 to 81348, scale 1:20 000.

Ontario Geological Survey. 2000a. Armstrong-Lake Nipigon area lake sediment survey: Operation Treasure Hunt - Area C; Ontario Geological Survey, Open File Report 6027, 96p.

Ontario Geological Survey. 2000b. Nakina-Longlac area lake sediment survey: Operation Treasure Hunt - Area B; Ontario Geological Survey, Open File Report 6035, 144p.

Ontario Geological Survey. 2000c. Airborne magnetic and electromagnetic surveys, Garden-Obonga area; Ontario Geological Survey maps 82096 to 82110, scale 1:20 000.

Ontario Geological Survey. 2000d. Airborne magnetic and electromagnetic surveys, Vickers area; Ontario Geological Survey maps 82145 to 82149, scale 1:20 000.

Patterson, G.C. 1980. The geology of the Kapkichi Lake ultra-mafic bodies and related Cu-Ni mineralization, Pickle Lake, Ontario; unpublished PhD thesis, Carleton University, Ottawa, Ontario, 331p.

Pye, E.G. 1965. Geology and Lithium Deposits of Georgia Lake area, District of Thunder Bay; Ontario Department of Mines, Geological Report 31, 113p.

Pye, E.G. 1968. Geology of the Crescent Lake area, District of Thunder Bay; Ontario Department of Mines, Geological Report 55, 72p.

Pye, E.G. 1976. Geology of the Crow River area, District of Kenora (Patricia portion); Ontario Department of Mines, Open File Report 5152, 264p.

Pye, E.G., Harris, F.R., Fenwick, K.G. and Baillie, J. 1966. Tashota-Geraldton sheet, Thunder Bay and Cochrane districts; Ontario Department of Mines, Geological Compilation Series Map 2102, scale 1:253 440.

Sage, R.P. and Breaks, F.W. 1982. Cat Lake-Pickle Lake area, districts of Kenora and Thunder Bay; Ontario Geological Survey, Geological Report 207, 238p.

Steers, J.E. 1973. Diamond drill log report, Amax Exploration, Inc., Altitude Group; Thunder Bay North Resident Geologist's office, 42E14/NE, assessment file, 5p.

Stern, R.A., Hanson, G.N., and Shirey, S.B. 1989. Petrogenesis of mantle-derived, LILE-enriched Archean monzodiorites and trachyandesites (sanukitoids) in southwestern Superior Province, Canadian Journal of Earth Sciences, v.26, p.1688-1712.

Stott, G.M. 1996. The geology and tectonic history of the Central Uchi Subprovince; Ontario Geological Survey, Open File Report 5952, 178p.

Stott, G.M., Brown, G.H., Coleman, V.J., Green, G.M. and Reilly, B.A. 1989. Precambrian geology of the Pickle Lake area, western part; Ontario Geological Survey, Map P.3056, Geological Series - Preliminary Map, scale 1:50 000.

Stott, G.M., Morrison, D., Gale, V. and Wachowiak, N. 1996. Precambrian geology of South-Central Onaman-Tashota greenstone belt; Ontario Geological Survey, Preliminary Map P.3352, scale 1:50 000.

Stott, G.M., Straub, K.H. and Fortin, D. 1998. Precambrian geology of Willet-Gledhill lakes area, Onaman-Tashota greenstone belt; Ontario Geological Survey, Preliminary Map P.3390, scale 1:30 000.

Thomson, J.E. 1938. The Crow River area, District of Kenora (Patricia portion); Ontario Department of Mines, v.47, pt.3, 39p.

Thurston, P.C. and Carter, M.W. 1970. Operation Fort Hope; Ontario Department of Mines, Miscellaneous Paper 42, 64p.

Tomlinson, K.Y. 2000. Neodymium isotopic data from the central Wabigoon Subprovince, Ontario: Implications for crustal recycling in 3.1 to 2.7 Ga sequences; Geological Survey of Canada, Current Research 2000-F8, Report 13, 10p.

Tomlinson, K.Y. and Percival, J.A. 2000. Geochemistry and Nd isotopes of granitoid rocks in the Shikag-Garden Lakes area, Ontario: Recycled Mesoarchean crust in the central Wabigoon Subprovince; Geological Survey of Canada, Current Research 2000-E12, 11p.

Verbeek, T., Dehenne, R. and Bowdidge, C. 1972. Geophysical case-history: The Thierry copper-nickel deposit in northwestern Ontario, Canada; 24th International Geological Congress, Section 9, p.135-151.

Vowles, A. 1971. Diamond drill log report, Hudson Bay Exploration and Development Company Limited, Altitude Lake area; Thunder Bay North Resident Geologist's office, 42E14/NE, assessment file, 3p.

Watts, Griffis and McQuat Limited 1993. Report on phase A of a feasibility study of the Pickle Crow/Central Patricia deposits, 65p.

Zayachkivsky, B. 1985. Granitoids and Rare Element Pegmatites of the Georgia Lake area, Northwestern Ontario. Unpublished M.Sc. thesis, Lakehead University, Thunder Bay, Ontario, 234p.

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Ontario

Ontario Geological Survey
Regional Resident Geologist Program

Northwest Regional Land Use Geologist District – 2000

by

R. Debicki and A. Drost

2001

CONTENTS

NORTHWEST REGIONAL LAND USE GEOLOGIST – 2000

INTRODUCTION 1
Regional Land Use Geologists 2
REGIONAL LAND USE GEOLOGIST ACTIVITIES 3
Crown Land Planning 3
Development on Private Land 3
First Nation Interests 4
REGIONAL DISTINCTIONS 4
NORTHWEST ONTARIO ACTIVITIES 5
Introduction 5
Ontario's Living Legacy Land Use Strategy 5
Forest Management Plans 6
Development on Private Land 6
First Nation Interests 6

REGIONAL LAND USE GEOLOGIST – NORTHWEST

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Introduction

Over the past several years, the Government of Ontario has re-engineered the way it delivers services to the people of Ontario. The changes that may be most familiar to the exploration community are the centralization of the Mining Recorders in the province and the posting of claim maps and claims information on the Ministry's website. At the same time, other changes have happened in other ministries throughout government. Some of them have had implications for the Resident Geologist Program.

As a result of these modifications, staff of the Resident Geologist Program have found themselves dealing with new clients in government, agencies, and non-governmental organizations, and delivering services that they had not delivered in past. These new services are important. Many of them relate to land use planning matters that are of interest to, or may directly affect, prospectors and developers. Many of them require knowledge and expertise that are outside the traditional knowledge and experience of professional geoscientists.

Some of these services relate to managing Crown land. They include working with the Ministry of Natural Resources to implement *Ontario's Living Legacy* which involves the establishment of 378 new parks or park expansions and conservation reserves across Ontario, and defining areas of "provincially significant mineral potential" within these new protected areas where mineral exploration will be allowed to proceed. They include administering work permits required for exploration activity in defined environmentally sensitive areas where natural heritage values need special protection, and ensuring that the mineral sector's interests are considered and accommodated in other land use planning initiatives such as forest management plans and the sale and transfer of Crown land.

Other services relate to municipal planning. They include working with Ministry of Municipal Affairs and Housing to review new municipal Official Plans, Official Plan Amendments, and consents (lot severances). Changes made to the *Planning Act* in 1996 recognize the interests of the mineral sector and the importance of protecting areas of high mineral potential from incompatible uses, and require that these considerations be factored into the municipal planning process. These considerations are important in the north where municipalities encompass huge tracts of land, including large areas of base and precious metals potential. They are also important in the south where industrial minerals are essential to the current, rapid expansion of existing communities and to the development of new ones.

In addition, there are emerging requirements for staff of the Resident Geologist Program to help ensure that access to the land base remains open to the exploration community, and to work with First Nations and the mineral sector to develop shared understanding of the other's rights, obligations, and interests in mineral exploration and development on Crown land.

These new and emerging needs were resulting in Resident Geologist Program staff having to divert their energies away from the traditional client services provided to the exploration and development community to attend to land use planning matters. On average, about 20 per cent of staff time was being

directed toward such work – although in Southern Ontario, land use planning consumed as much as 75 per cent of staff time. The end result was less time being available for delivering the level of traditional program services to which mineral industry clients had become accustomed.

To address these converging concerns, three new positions were created and the new "Regional Land Use Geologists" were hired in the autumn of 2000 to alleviate some of the pressures that impacted on the program. These new positions combine geoscience and mineral sector expertise with an understanding of land use legislation, regulations and issues.

Regional Land Use Geologists

Abraham Drost, the Regional Land Use Geologist based in Thunder Bay, is responsible for matters related to land use in the Red Lake, Kenora, Thunder Bay North and Thunder Bay South Resident Geologist districts. He has an M.Sc. degree in geology and a Certificate in Environmental Assessment, and has studied real estate law. Abraham has 16 years' experience in mineral exploration and development and was involved in the discovery of the past-producing Golden Patricia gold mine in northwestern Ontario. He has served on the executive of prospectors' organizations in Thunder Bay and Timmins.

Gord Yule, the Regional Land Use Geologist based in Timmins, is responsible for matters related to land use in the Timmins, Kirkland Lake, and Sault Ste. Marie Resident Geologist districts, plus those portions of the Sudbury Resident Geologist District north of the French River. He has a B.Sc. degree in geology, and 25 years' experience in mineral exploration, during which time he has been involved in the discovery of eight deposits in northeastern Ontario, including five past and present producers.

Dave Rowell, the Regional Land Use Geologist based in Sudbury, is responsible for those portions of the Sudbury Resident Geologist District south of the French River, including Manitoulin Island, plus the Southwestern Ontario and Southeastern Ontario Districts. Dave has an M.Sc. degree in Physical Geography, and 18 years' experience in mapping surficial geology and defining and managing aggregate and industrial mineral resources in the private sector and with the Government of Ontario.

The boundaries of the Regional Land Use Geologist Districts are shown on the map included in the preface to this report.

The result of these appointments, which mark the first significant increase in Resident Geologist Program staff in many years, will be twofold. There will be a reduction of the workload relating to land use issues for other Resident Geologist Program staff, allowing them to concentrate more fully on "traditional" services including:

- maintaining and providing access to assessment files, the drill core library system and other geoscience databases;
- providing information and expert advise on local geology and its mineral endowment;
- conducting client property visits and geology field trips; and
- monitoring exploration activity and generating new recommendations for exploration.

The Regional Land Use Geologists will focus their attention on "emerging" services including:

- providing mineral-related information in support of Crown land planning;

- protecting mineral resources and operations from "sterilization", and people and property from mining and natural hazards during municipal planning; and
- helping explorationists and First Nations understand each other's interests, activities and obligations in mineral exploration and development.

The Resident Geologist Program has created these new staff positions to ensure that knowledgeable service is provided regarding these and other land use issues, since finding solutions to these matters is vital to the health and sustainability of the mineral sector. Liaison with and input from mineral sector representatives, including local prospectors and their associations, will form an essential contribution to the successful delivery of land use planning services that support mineral exploration and development.

REGIONAL LAND USE GEOLOGIST ACTIVITIES

Crown Land Planning

The Ministry of Natural Resources manages Crown land in Ontario through the *Public Lands Act*, the *Parks Act*, the *Aggregate Resources Act*, the *Crown Forest Sustainability Act*, the *Conservation Authorities Act*, the *Oil, Gas and Salt Resources Act*, and other acts. The Ministry of Northern Development and Mines also contributes to Crown land management in the province through the *Mining Act*.

The Regional Land Use Geologists are working closely with Ministry of Natural Resources and their partners in several key areas. They are helping implement the *Ontario's Living Legacy* land use strategy by assisting in the regulation process for the new parks and conservation reserves, and in the development and application of criteria to allow "controlled exploration" in areas within those protected sites where there is provincially significant mineral potential.

They are helping to develop guidelines for the nine "Signature Sites" identified through the *Ontario's Living Legacy* land use strategy; reviewing management plans for both existing and new protected areas; and contributing to other land use planning and policy matters such as the Niagara Escarpment Plan.

The Regional Land Use Geologists are also working to help the mineral exploration and development community understand the forest management planning process, and to know how and when prospectors and developers should participate to ensure that their interests are considered. Forest management plans set the framework for activities in forest units for twenty-year spans, and establish the schedule and locations for access routes during that time. In addition, the Regional Land Use Geologists are working with the Ministry of Natural Resources to establish strategies for allowing the mineral sector to continue to access existing forest access roads.

Development on Private Land

The Ministry of Municipal Affairs and Housing manages planning on private land in Ontario through the *Planning Act*, the *Municipal Act*, and other legislation. Through their one-window approach, the Ministry of Northern Development and Mines (MNDM) contributes to municipal planning by providing mineral-related technical information regarding private land to municipal governments,

provides advice on planning matters that may affect mineral exploration and development, and comments on areas of mineral potential or mining-related hazards.

In conjunction with other program staff, the Regional Land Use Geologists review and comment on draft municipal Official Plans and Official Plan Amendments along with other planning matters including subdivision plans and consents (lot severances) where the approval authority lies with the Province of Ontario. They also provide training sessions and reference materials to representatives the Ministry of Municipal Affairs and Housing and to municipal planners representing communities across the province. In addition, they may be called upon to serve as "expert witnesses" in cases where planning decisions are being reviewed by the Ontario Municipal Board or other tribunals.

First Nation Interests

First Nation communities across Ontario are looking for new economic opportunities. As well, they are asserting their Aboriginal rights and claiming higher levels of involvement and control concerning economic activity on Crown land within their traditional areas. As a result of a lack of clarity regarding Aboriginal rights on one hand, and some First Nations' lack of familiarity with the "mining sequence" on the other, conflicts have arisen between some explorationists and developers and certain First Nations.

The Regional Land Use Geologists are working with the mineral sector and with representatives of other government ministries and First Nation communities to establish mutual understanding of the actions, implications, and obligations of mineral exploration and development workers, and to facilitate their activities on traditional lands. This work includes sharing information concerning Aboriginal rights and the related obligations of the mineral sector, and discussing the stages of the mining sequence and resulting business opportunities with First Nation community members. The Regional Land Use Geologists are also helping resolve certain land claims in their respective areas.

REGIONAL DISTINCTIONS

It is worthwhile to note that there are significant differences between the critical land-use planning concerns in different parts of Ontario. Northwestern Ontario can be considered the province's "exploration frontier" while northeastern Ontario is an area of more mature exploration and established mining. Southern Ontario is more populated and mineral sector interests are concentrated on a growing industrial mineral and aggregate industry. Each region has its distinct assemblage of planning-related issues.

Northwestern Ontario, the province's "exploration frontier", is characterized by large tracts of open Crown land. Forest management and logging activities are regionally important and First Nation communities throughout the region are expressing their interest in Aboriginal rights. The area has limited infrastructure and access to remote areas, and is considered under-represented in terms of protected areas.

Northeastern Ontario has a high density of mining land tenure and numerous producing and past-producing mines. Forest management and logging activities are also regionally important and there are local to widespread Aboriginal issues. The area is also considered to be under-represented in terms of protected areas, but has more urbanization, infrastructure and private land holdings than northwestern Ontario, making it more difficult to identify unencumbered lands that may be set aside to protect and preserve natural heritage values.

Southern Ontario is an area with much higher population density and a relatively small amount of Crown land, and a greater focus on a growing industrial mineral and aggregate industry. There is major urbanization and well-developed infrastructure, however the high population density leads to greater opposition to many mineral-related activities and developments.

NORTHWESTERN ONTARIO ACTIVITIES

Introduction

There are at least 12 major provincial legislative acts, with accompanying regulations, guidelines and policies developed by several provincial ministries that relate to land use in Ontario. Some apply to Crown land while others apply to private land. The Regional Land Use Geologist combines geoscientific, mineral exploration and development expertise with an understanding of provincial legislation, regulations, policies and land use issues in order to optimize Ontario's land base for sustainable, safe and environmentally responsible mineral resource development.

The Northwest Regional Land Use Geologist delivers on this mandate with other provincial ministries, municipalities, land-use interest groups and First Nations within the region to address matters including implementing the *Ontario's Living Legacy* land use strategy, preparing forest management plans and monitoring development on private land.

Ontario's Living Legacy Land Use Strategy

A total of 96 *Ontario's Living Legacy* sites are identified as new protected areas in northwestern Ontario. These include 21 new provincial parks or additions to existing parks (designated P-series), and 75 new conservation reserves (designated C-series). Thirty-five of the new parks and conservation reserves in the northwest have been announced for regulation by the Ministry of Natural Resources (MNR) by early 2001. All new proposed protected areas were reviewed by the Regional Land Use Geologist in order to ensure that pre-existing mining land tenure was properly designated as Forest Reserve, i.e. areas in which mineral exploration will continue to be allowed as long as the mining land tenure remains in good standing. The Regional Land Use Geologist also participated on the Lake Nipigon Basin Signature Site planning team.

The *Ontario's Living Legacy* land use strategy allows for controlled mineral exploration in specified areas within new parks and conservation reserves identified as having "provincially significant mineral potential" (PSMP). If a mineral discovery is made in such an area and the site develops into an advanced exploration project or a new mine, the area of the discovery or proposed disturbance will be de-regulated and an appropriate, alternative area of equal size and natural heritage value will be regulated as protected area. Upon site rehabilitation at the completion of the exploration/mining activity the deregulated land will be returned to park status.

The Regional Land Use Geologists have contributed to a committee of industry and government representatives assembled to define the criteria for "provincially significant mineral potential" and a process for ranking the potential of areas of interest. At the time of writing, the process for defining PSMP is currently close to completion. It is envisioned that this mineral potential evaluation process will be incorporated into future land use planning activities and initiatives for both Crown and private lands in the province.

Forestry Management Plans

The Regional Land Use Geologist, in co-operation with the Ontario Prospectors Association (OPA), has spearheaded development of a Microsoft® Access® database of information related to Forest Management Plans in Ontario for use by clients and those involved in the forest management planning process. The database is part of a larger effort to co-ordinate MNDM and OPA planning interests in the context of forest management planning and to stimulate the proactive involvement of the prospecting and exploration community in the planning process.

Development of formal "Guidelines for Strategic Access to Mineral Values" by the Regional Land Use Geologist is a further extension of joint MNDM-OPA co-operation in planning interests. It is envisioned that these guidelines will eventually be included as a formal part of forest management planning process in Ontario. Access to known mineral values and areas of significant mineral potential would then be optimized as new forest-access roads are planned and built by the forest companies operating throughout the province.

Development on Private Land

The Northwest Regional Land Use Geologist reviewed a total of 24 applications for development on private land in the last quarter of 2000. Most files were circulated for review and comment by a partner ministry, the Ministry of Municipal Affairs and Housing (MMAH). All applications were reviewed for their impact on mineral exploration and development opportunities and activities within areas of high mineral potential, and for their proximity to mine hazards.

Further effort, including a site visit and presentation to a town council, was made in reference to a site under application by a private developer wanting to subdivide patented mining claims for cottage lot development. An increasing number of such applications are under evaluation by the Ministry. All are considered in the context of the mineral potential of the sites and the presence of mine hazards that may pose potential public safety and environmental concerns.

First Nation Interests

The Northwest Regional Land Use Geologist provided assistance to a junior exploration company with regard to their plans for conducting mineral exploration on claims within Aboriginal traditional lands. Exploration and development activities in remote parts of the northwest and other regions of the province are increasingly becoming issues for discussion between explorationists and Aboriginal communities intent on building greater autonomy and economic self-reliance. Increasingly, explorationists are entering into a Memorandum of Understanding (MOU) with individual Aboriginal communities that identify the terms and conditions for releasing information to the First Nations and for respecting the natural environment.

Metric Conversion Table

Conversion from SI to Imperial			Conversion from Imperial to SI		
SI Unit	*Multiplied by*	*Gives*	*Imperial Unit*	*Multiplied by*	*Gives*
		LENGTH			
1 mm	0.039 37	inches	1 inch	**25.4**	mm
1 cm	0.393 70	inches	1 inch	**2.54**	cm
1 m	3.280 84	feet	1 foot	**0.304 8**	m
1 m	0.049 709	chains	1 chain	20.116 8	m
1 km	0.621 371	miles (statute)	1 mile (statute)	**1.609 344**	km
		AREA			
1 cm^2	0.155 0	square inches	1 square inch	**6.451 6**	cm^2
1 m^2	10.763 9	square feet	1 square foot	**0.092 903 04**	m^2
1 km^2	0.386 10	square miles	1 square mile	2.589 988	km^2
1 ha	2.471 054	acres	1 acre	0.404 685 6	ha
		VOLUME			
1 cm^3	0.061 023	cubic inches	1 cubic inch	**16.387 064**	cm^3
1 m^3	35.314 7	cubic feet	1 cubic foot	0.028 316 85	m^3
1 m^3	1.307 951	cubic yards	1 cubic yard	0.764 554 86	m^3
		CAPACITY			
1 L	1.759 755	pints	1 pint	0.568 261	L
1 L	0.879 877	quarts	1 quart	1.136 522	L
1 L	0.219 969	gallons	1 gallon	**4.546 090**	L
		MASS			
1 g	0.035 273 962	ounces (avdp)	1 ounce (avdp)	28.349 523	g
1 g	0.032 150 747	ounces (troy)	1 ounce (troy)	**31.103 476 8**	g
1 kg	2.204 622 6	pounds (avdp)	1 pound (avdp)	**0.453 592 37**	kg
1 kg	0.001 102 3	tons (short)	1 ton (short)	**907.184 74**	kg
1 t	1.102 311 3	tons (short)	1 ton (short)	**0.907 184 74**	t
1 kg	0.000 984 21	tons (long)	1 ton (long)	**1016.046 908 8**	kg
1 t	0.984 206 5	tons (long)	1 ton (long)	**1.016 046 90**	t
		CONCENTRATION			
1 g/t	0.029 166 6	ounce (troy)/ ton (short)	1 ounce (troy)/ ton (short)	34.285 714 2	g/t
1 g/t	0.583 333 33	pennyweights/ ton (short)	1 pennyweight/ ton (short)	1.714 285 7	g/t

OTHER USEFUL CONVERSION FACTORS

	Multiplied by	
1 ounce (troy) per ton (short)	31.103 477	grams per ton (short)
1 gram per ton (short)	0.032 151	ounces (troy) per ton (short)
1 ounce (troy) per ton (short)	20.0	pennyweights per ton (short)
1 pennyweight per ton (short)	0.05	ounces (troy) per ton (short)

Note: Conversion factors which are in bold type are exact. The conversion factors have been taken from or have been derived from factors given in the Metric Practice Guide for the Canadian Mining and Metallurgical Industries, published by the Mining Association of Canada in co-operation with the Coal Association of Canada.